FOOD MANUFACTURE

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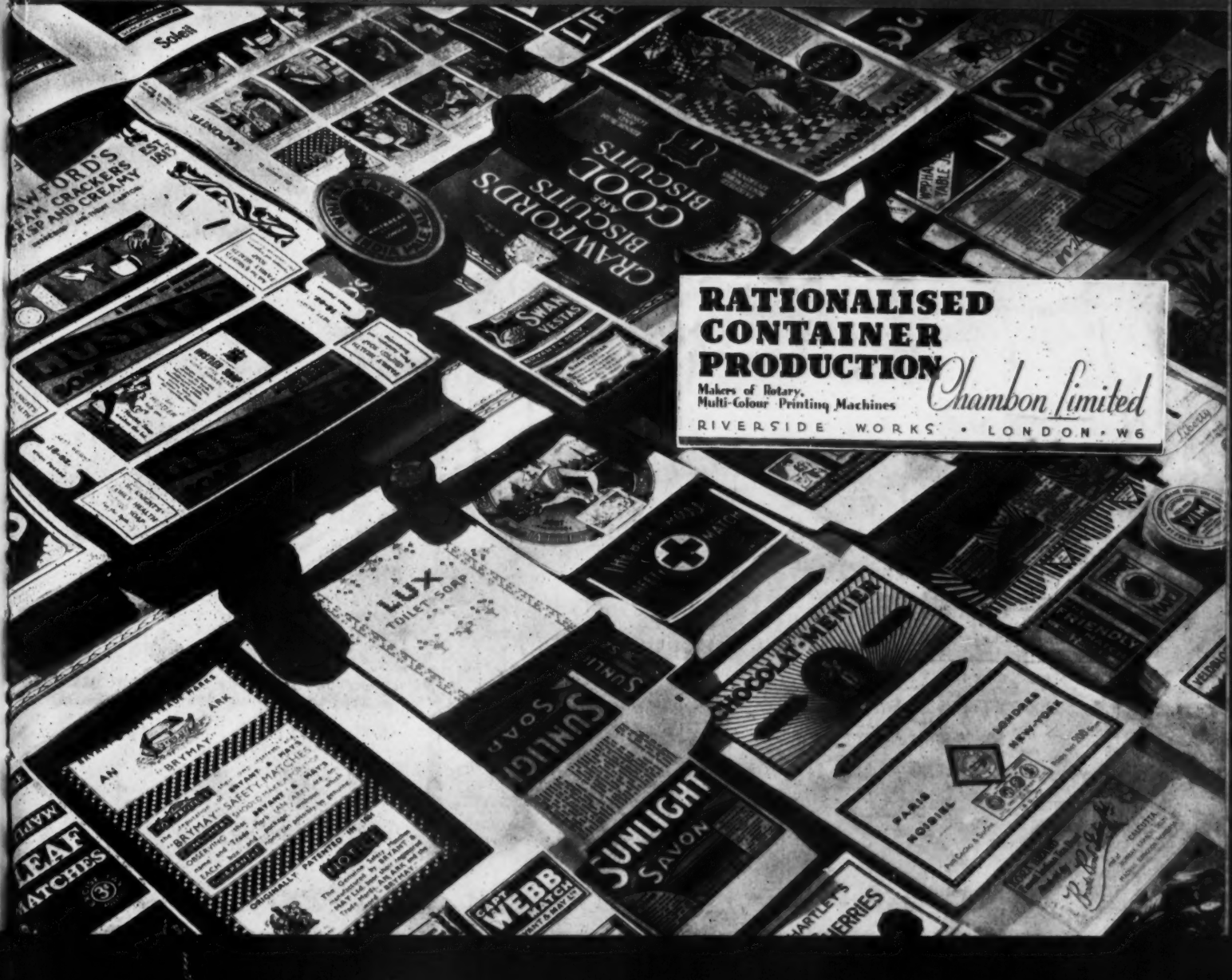

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

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FOOD MANUFACTURE

Vol. XII, No. 1 **January, 1937**

Looking Back—1936

A REVIEW of technical developments in food manufacture during the year 1936 might easily occupy all the pages of this number. These are eventful days in which we live, and the large industrial group which caters for the food supply of the country has had perhaps more than its share of the difficulties. The Marketing Boards have not been the success they were expected to be. Market prices of commodities have risen steadily. Agreements with foreign countries have benefited our export trade, more especially in the heavy industries, but there is not so much opportunity to increase trade in the food industries through the export markets. Storage of food for the eventuality of war, for which we have striven throughout the past year, has only just reached the stage of the formation of a Food (Defence Plans) Department, as a part of the Board of Trade, under the stewardship of Mr. H. L. French, recently appointed from the Ministry of Agriculture. The comprehensive study of nutrition is in its very early stages, but its consequences for food manufacturers are, we consider, very far reaching indeed.

If we look for a moment at prices of stocks and shares during the past year we find that food manufacturing concerns have not been backward when compared with other industrial concerns. In fact, prices of their shares, almost without exception, are higher than the lowest prices shown during the year, while in many cases the prices at the end of the year were the highest attained. In periods of increasing prosperity it is reasonable to expect increased prosperity for companies supplying foodstuffs. This improvement, much of which is due to national expenditure on rearmament, has provided more money to spend on foodstuffs, whether of the essential or luxury kind, but there is a long way to go before everyone has sufficient purchasing power to make sure of obtaining at least the minimum amount of nourishing food. Then, and not until then, will the production of foodstuffs reach a sensible maximum.

Looking Forward—1937

In the coming year consumption of food should increase, particularly with the large number of visitors for the Coronation, the date of which happily remains unchanged. An important reassuring factor for the future is that the favourable background of good trade and cheap money has not changed, and to all appearances the full economic and financial life of the country must continue to develop. It is not only in this country that trade expansion is proved by statistics, but in the United States also, where the chief preoccupation of the Government and its advisers has been to prevent the incipient boom from developing too quickly. Foreign political influences, especially in Europe, provide the chief uncertainties. We should see progress and, we trust, practical achievement in the storage of certain classes of foodstuffs in connection with the national defence schemes, but we can hardly hope for any practical result to arise so soon from the study of nutritional problems, even though the public is becoming more nutritionally conscious. The scientific and technical development of food manufacturing processes will go on unarrested, and it is our function to assist in its advancement. Nevertheless, we believe these other matters to which we have referred in the preceding paragraph are fundamental to the fullest possible development of the food industries as a whole. We take this opportunity of expressing the wish that all our friends at home and abroad will enjoy, in increasing measure, the prosperous time that undoubtedly lies ahead of us.

Watchful Science

There are many people, even to-day, who are very suspicious about the activities of chemists, particularly in the foodstuffs industries, and there is a widespread belief that they are concerned chiefly with adulteration and sophistication. Those who have such views would do well to study the report of Dr. J. J. Fox, the Government Chemist,

from which they would learn something of the work of chemists in protecting the public from fraud and ensuring that the nation's food supply is kept pure and wholesome. Actually the number of samples examined in the course of the year was 546,279—over 10,000 samples to be examined every week is rather a stupendous task, and obviously this careful vigilance must do much to maintain purity in our food supplies. Among the principal increases in the number of tests were samples of sugar goods, largely caused by increased importation of canned fruits. It is interesting to note the number of tests under the National Mark Scheme—409 samples of flour, 423 of cheese, 249 of cider, 202 of honey and, rather surprising, 41 samples of water from watercress beds.

Lime Juice for Sailors

One interesting part of the Report deals with Lime and Lemon Juice for the Mercantile Marine. The Merchant Shipping Act provides that every foreign-going ship shall carry a supply of lime or lemon juice and that 1 oz. per day shall be served to every member of the crew after the ship has been at sea for 10 days. The chemical examination of the raw juice which it is proposed to ship and of the juice after fortifying with spirit is carried out in the Government laboratory. During last year 137 samples of raw juice were examined and 16,072 gallons of juice were approved. An Order in Council has been issued (The Merchant Shipping [Antiscorbutics] Order in Council, 1927) making provision for the use, if desired, of concentrated orange juice. The Order specifies the juice, and it is required that it shall be so prepared and stored that there is no loss in potency in respect of vitamin.

Agricultural Research

There is much of interest to food manufacturers in the recently issued report of the Agricultural Research Council covering a period from October, 1933 to September, 1935. Naturally much of it deals with pure agricultural problems such as animal diseases, but such items as costing studies for sugar beet and the economics of strawberry culture are of interest to non-farmers. There is a reference to the Fruit and Vegetable Preservation Research Station at Chipping Campden, and it is stated that "the recent large development in the growing and canning of peas may be said to have been made possible by Campden, where a harmless process of greening, so as to reproduce the natural colour of the pea, which is lost in canning, was discovered". Another interesting section deals with the canning of strawberries. There are some varieties in both England and Scotland which, though canned whole, fall to pieces in the process. This has been traced to the activities of a new fungus which has been christened *Byssochlamys fulva*. There is no doubt that stations like Long Ashton, East Malling, and Chipping Campden are doing most useful work, especially for the canning industry. At Campden, particularly, the interests of small growers have been given consideration and suitable plant for their needs has been devised.

The Milk Muddle

The situation in regard to milk is by no means satisfactory. The Milk Marketing Board has not been a success. It has resulted in an unprofitable increased production and the creation of an undesirable surplus. Many efforts have been made to stimulate a greater consumption of liquid milk, but no great results have been achieved. There seem to be interminable arguments between producers, retailers, and distributors to the detriment of the consumers. No one would deny the value of milk as a food nor the desirability of its being made more widely available to all classes of the community. It is a national necessity, and as such it should be the direct charge of the Government to ensure its economic production and distribution. So far the farmers have had many chances, but do not seem to have solved the problem, and, much as we dislike the idea, there seems nothing for it but to nationalise the cow. With something of this in mind the Milk Reorganisation Commission recently issued a report on a milk production policy that would be adjusted to the nation's needs. Needless to say it has fallen foul of the National Farmers Union, which body in its so-called wisdom has expressed unqualified disapproval of the entire report. It must be remembered that the Report was unanimous. It must also be understood that the nation must have its milk. There is no time for argument and bickering. The Government must control the milk industry to the benefit of the people. They cannot very well mismanage it more than the farmers and their union have done so far.

Cream Conundrums

It seems as if the question of when is cream not cream will continue to pop up at regular intervals all over the country. We thought that the evidence produced in previous cases would have made

inspectors realise that the term cream in the confectionery trade is quite a different proposition from that in the dairy industry. No one would think of taking action against a baker for "creaming" his butter and sugar. Even our standard dictionaries are in difficulties with cream. The one before us now is typical: "the oily substance which forms on milk, the best part of anything, any cream-like preparation, as cold cream for the skin". Something ought to be done to clarify the situation and stop the prosecutions that are continually being instituted. Recently a Liverpool firm was accused of selling to the prejudice of the purchaser an article of food—cream drops—which was not of the substance demanded. There were similar accusations in regard to jelly creams, cream sandwich, and raspberry-and-cream sandwich. The case resulted in a fine of £1, but no positive value to the public. In fact, from the public's point of view, we can see no useful purpose in the prosecution. It is absurd that every time the word cream is used in connection with confectionery the public analysts should stipulate that it should refer to the dairy product. In view of the looseness with which the word cream is now used, and its acceptance by the trade, we consider that these prosecutions are merely irritants and are of no use to anyone. In any case they should be discontinued until some official standard is set up and a restricted definition of cream framed.

Grapefruit Crystals

With the increasing popularity of grapefruit and the advent of grapefruit squashes and cordials it was only a matter of time before the arrival of synthetic crystals. The Sheffield public analyst has found them and discovered that they were described as "Manufactured in ideal surroundings from specially selected juicy, luscious Californian grapefruit". Analysis, however, showed the product to be the well-known mixture of bicarbonate of soda, tartaric acid, and sugar, which in our young days masqueraded under the names of *lemon kali* or *sherbet*. It is unfortunate for the manufacturers of this article that the acid of grapefruit happens to be citric acid and not tartaric. That makes the talk about "juicy, luscious Californian grapefruit" sound a little silly. Apparently the makers were forced to withdraw the article from the market. We would warn would-be vendors of such frauds that, as Pooh Bah found, the addition of bits of "corroborative evidence to add verisimilitude to an otherwise bald and unconvincing narrative" can be very risky.

Tinplate Corrosion

The second report on the Corrosion of the Tinplate Container by Food Products, by T. N. Morris, M.A., and J. M. Byran, B.Sc., Ph.D., has recently been issued by the Food Investigation section of the Department of Scientific and Industrial Research (H.M. Stationery Office, price 1s. net). The first chapter deals with the Corrosion of Tin, the second with the Corrosion of Mild Steel, the third with the Tin-Iron Couple and Tinplate. The Discoloration of Canned Fruits and Miscellaneous Points of Technique, including the Summary, form the fourth and fifth parts respectively. It is suggested that in all probability the corrosion of cans by foodstuffs will eventually be overcome by improvements in lacquers and methods of lacquering. Failing such a development, relief must be sought through improvements in tin coating, improvements in the steel base, the cool storage of canned goods, and the application of knowledge concerning the corrosion of tinplate. Methods of effecting such improvements are discussed and experiments are described that throw further light on the factors affecting the formation of hydrogen swells and perforations and the discoloration of canned fruits.

Progress of Insecticide Research

Dr. F. Tattersfield, head of the Insecticides and Fungicides Department at the Rothamsted Experimental Station, and Dr. J. T. Martin, assistant chemist, delivered papers on "Modern Developments in Research on Insecticides" at the joint meeting of the London section and the Food Group of the Society of Chemical Industry on Monday, December 7. Dr. Tattersfield dealt with different types of manufactured insecticides, dividing them into contact poisons and internal poisons. He spoke of the advances made in determining the speed of toxic action, for some insecticides are slow but cumulative, while others are rapid but then weaken. The mode of application has a profound effect on the toxicity of some insecticides. The final decision on the effectiveness of all types of insecticides is determined by their performance in the field. Dr. Martin in his paper confined himself to the insecticides obtainable from fish poisoning, plants, and pyrethrum. He mentioned the work of Potter on the control of insect pests in warehouses, particularly warehouses containing dried fruits from Australia. He used a preparation of pyrethrum in white oil, which atomised as a white mist filling the warehouse. Pyrethrum is believed to act as a nerve paralyser.

Trade with Baltic Countries

The four Baltic countries, Denmark, Sweden, Finland, and Norway, purchased from Great Britain, in 1935, goods to a value of thirty-seven million pounds. This is a value much greater than that of any other foreign country. These facts are brought out in the report on the visit of the delegation of the Advertising Association to Denmark, Sweden, Finland, and Norway on the occasion of their convention cruise in July, 1936. The delegation found that the international trade agreements concluded with our northern customers a few years ago had achieved good results. But Denmark is essentially an agricultural country and more than three-quarters of the value of the export trade consists of food products. In Sweden the proportion of the population depending on agriculture has declined amazingly and the growth of manufacturing industries has been fostered. Our purchases from Norway it reveals include cured or canned fish to the value of well over a million pounds a year. The report contains much information concerning advertising and the press for each of the four countries and many helpful facts for British traders.

The Wine and Food Society

Hearing that the Wine and Food Society had organised a tasting of English Ciders and Dessert Apples as one of its regular functions, we made a few enquiries and discovered that the co-operation of Professor B. T. P. Barker, of the Long Ashton Research Station, and Mr. E. A. Bunyard, of Maidstone, had been secured for the arrangement of one of their epicurean programmes. Mr. V. L. S. Charley, of the Long Ashton Station, whose name is well known in connection with the development of the new fruit products, was also responsible with Professor Barker for the cider arrangements. It is interesting and right, we think, that the scientific man should be invited to assist at such a function, but our curiosity was really aroused about that part of the Society's activities concerning food. The Society was founded in 1933 by a few enthusiasts who, believing that a right understanding and appreciation of good food and wine is an essential part of personal contentment and health, and who desired to bring together all those sharing this view, in an attempt to raise the standard of eating and drinking throughout the country. The attitude towards this very necessary part of our activities in life is certainly at a low standard in this country. We would like to see a much greater appreciation of the personal enjoyment that can be derived from the food we eat. The Society has distinguished adherents from scientific as well as medical, literary, and other walks of life. The list of functions held makes interesting reading. But at several of these functions wines are tasted alone and not as the accompaniment or as an essential constituent of a perfectly prepared and, should we add, completely balanced meal.

"Eat More . . ." Advertising

This exploitation of the "Eat More . . ." slogan to publicise different kinds of foods has passed from plagiarism by those who draw up advertisement copy through the more abstract aspect of how and when to eat food to the extremity of advertising something inedible. Quite recently we had "Eat More Often" sponsored by Cadbury. Lately Hector Powe exclaimed: "Eat More Overcoats." Why? Because, as he says in the advertisement, "If all this 'Eat More . . .' advertising is really successful, I shall begin to wish I had become a food merchant instead of a tailor." "But you see for yourself," he goes on to say, "how unimpressive the slogan is if you stick in 'overcoats' instead of 'fish' or 'fruit'. You just cannot persuade a man to make use of more than a certain quantity of overcoat, even if you do substitute 'wear' for 'eat'". It is, of course, not quite the same with food, because if you persuade a man to eat more fruit he has to give up eating something else, and the food industry is no better off as a whole. Perhaps this good-humoured tilt at the food campaigns will prove to be the last use of a slogan that has been repeated almost *ad nauseam*.

Heavy Beer Next?

Heavy water, D_2O, which is the compound of heavy hydrogen, or deuterium, and oxygen, has become almost commonplace in technical literature, and may now be purchased in small quantities at a cost of a few pounds per gram. Scientists are eagerly studying this curious substance for further enlightenment. No ill-effects seem to follow the practice of drinking heavy water. However, if heavy water does not satisfy thirst, would heavy beer? In some recent German experiments heavy water was subjected to alcoholic fermentation, and the result was a new compound, heavy alcohol, whose formula may be written, $CH_2.D.CD_2OD$. No further results are reported yet, and we must wait a little longer to learn what this new form of beverage is like. (Ref.: Z. *physik. Chem.*, 1936, 257.)

NUTRITION and the HALOGENS

Marion Norman, M.Sc., & A. G. Norman, D.Sc., F.I.C.
(of the Rothamsted Experimental Station)

Mineral Elements in General

THE IMPORTANCE of mineral elements in human nutrition has only been fully recognised during the past decade. At one time digestibility and caloric values were chiefly considered; then followed the vitamin period, which is now giving place to a more rational viewpoint, when the balance of all these factors is receiving attention. The emphasis is no longer on quantity, but has swung to quality. Research in human nutrition is a slow and difficult matter. Human beings cannot be put into cages or treated in groups with deficient or unbalanced diets. Much of the information obtained usually results from animal experiments, though there have been cases in which abnormal physiological conditions have been directly traced to dietary deficiencies. Human experiments have mostly been of the nature of curative treatments and because of individual variation are only reliable when carried out in large groups. It is therefore difficult to ascertain the amounts of different mineral nutrients that are necessary for proper maintenance of the adult or growth and development of the child. Examination of the whole dietary of different groups and classes is, however, yielding information along these lines, and will in time permit of satisfactory conclusions being drawn in human nutrition. In the case of animals, investigation may be more straightforward as by supplying controlled diets with predetermined deficiencies, the characteristic symptoms of the absence or shortage of any particular constituent may be determined and palliative measures studied.

In view of the interest now being taken in nutrition and the recognition of the important part played by mineral salts in metabolism, we invited Dr. Norman to contribute an account of the action of some of the less known minor elements. Investigation of the mineral salt content of various canned foods is now in progress at the Campden Research Station. Much of the important work on mineral elements in nutrition was carried out at the Rowett Institute, Aberdeen, and has been summarised in works by Sir John Orr and collaborators.—ED.

Major Elements and Minor Elements.

The need for certain mineral elements, such as calcium or phosphorus, in bone formation or calcification in animals or man is obvious, and these may be regarded as major mineral elements. Deficiencies of these do, in fact, occur from time to time, particularly in the young, and there is reason for supposing that children of the poorer classes may not uncommonly be receiving less than the full requirement of these constituents for proper calcification. The position with regard to what may be called the minor mineral elements that are essential in nutrition, but required only in very small amounts, is less straightforward, as their action is often subtle or obscure. In this connection the example of iron may be quoted. The statement has been made recently that many people are probably in a condition of partial iron deficiency, not recognisable by any clear symptoms. In a consideration of minor elements, it is instructive to take the analogy of plant nutrition in which investigation is far easier. Apart from the well-known major constituents, plants similarly require small amounts of certain minor elements, such as boron or manganese. It is, however, observed that the beneficial effect of such elements does not increase directly with concentration, and indeed that higher concentration may have instead a deleterious or even poisonous effect. No hard and fast line can be drawn between the two effects. Returning to human nutrition, it seems that the situation with respect to the minor elements may be somewhat similar, very small amounts being essential and larger quantities detrimental.

The Halogen Group

One of the most interesting groups of elements in any discussion of minor constituents is the halogen group, consisting of the four related elements—fluorine, chlorine, bromine, and iodine. Because of their many similarities in chemical behaviour it might perhaps have been expected that their roles in human or animal metabolism would not be very different. Of these four elements, however, two have been found to be essential, one detrimental and one apparently neither essential nor normally detrimental. The one of lowest atomic weight, fluorine, is detrimental in very low concentrations; the next, chlorine, is essential in amounts that almost put it out of the class of minor elements. The role of bromine, which follows in the series, is still unknown, whereas iodine is essential in extremely small amounts. While it is convenient to speak of these substances in their elemental form, as chlorine or iodine, they are of course required, and found almost exclusively in the combined form as inorganic salts or in organic combination. Chlorine, the most common and best known of the halogens, has long been known to be required in the form of chloride to meet tissue fluid requirements and to provide acid conditions in the stomach.

It is, of course, supplied chiefly as common salt in foods. A deficiency of chloride seldom occurs except in the case of miners, firemen, and stokers, who, being called upon for heavy manual labour under conditions of high temperature, lose salts through excessive perspiration. Muscular cramp ("bends") may be set up through chloride deficiency. Such workers often drink a dilute salt solution instead of water in order to restore their chloride equilibrium. There does not appear to be any reserve mechanism of chloride supply, for depletion is followed by immediate symptoms.

Bromine Inessential?

As far as is known, bromine does not seem to be an essential element in human nutrition, though bromides are of value for certain special medicinial purposes. The presence of bromides in the tissues and blood is believed to be quite fortuitous and dependent on the food uptake. It is proposed in this article, therefore, to consider in more detail the remaining two halogens, iodine and fluorine, the effects of which are produced by extremely small amounts of the element.

Fluorine Provides an Enigma

Fluorine is, at the moment, something of an enigma. Whether or not it is an essential element is not certain, though it is found in the bones and teeth. No beneficial effects of fluorine on man or animals have ever been observed. A serious dental effect has, however, been traced to the presence in the diet of too much fluorine. This defect, which is characterised by mottling of the enamel and a chalky and lustreless appearance of the teeth, seems to occur mainly as a result of fluoride in the water supplies. The fluorine present in water is usually extremely small in amount, and the limit above which this defect of teeth is likely to result has been set at the low figure of 1·5-2·0 parts per million. The action of fluorine only takes place during the development and formation of the teeth, and in consequence is only manifest in people who as children lived in a region in which the fluorine content of the water was above the safe limit. Persons whose permanent teeth are fully developed seem entirely unaffected on moving into such a region. The serious aspect of the question is that the defect is permanent and irreparable, and gives no accompanying indication of its presence. Endemic areas of mottled enamels due to fluorine have been found in various parts of the United States, particularly in the West and Rocky Mountains areas. The only well-authenticated cases in this country have been found amongst the school children of Maldon, Essex, the water of which region contains from 4·5-5·5 parts of fluorine per million. The mode of action of the fluorine is not clear, but presumably the proper formation of the enamel is interfered with. The enamel of normal teeth is composed largely of apatite, only 0·6 per cent. being fluorapatite. Comparable analyses of the enamel of mottled teeth have not been obtained. Inasmuch as bones are not dissimilar in composition to teeth, there is the possibility that in the presence of fluorine some changes not so obvious as those in the teeth also take place in the bones. The bones of animals on a diet containing fluoride have been found to be appreciably higher in fluorine content.

No comprehensive survey of the distribution of fluorine has been undertaken. Until recently the analytical methods for detecting such small quantities of fluorine were very unreliable, and even now rival methods do not precisely agree. The fluorine content of certain mineral waters has been reported to be as high as 8 parts per million. Analyses on food materials are scanty, and it is clear that in view of the nutritional importance of this element, a detailed study should be made. The fluorine content of egg yolk has been given as 11·7 parts per million, of rice as 9·1 parts, of spinach as 8·6 parts, of maize as 8·5 parts and of oats as 10·4 parts.

The Role of Iodine

There is much more information as to the distribution of iodine and its role in nutrition. Iodine is an essential element in extremely small quantities and plays an important part in general growth and development by providing for the proper working of the thyroid gland. Extreme cases of iodine deficiency are accompanied in the adult by goitre, and in children by goitre, arrested development, and cretinism. The connection between iodine deficiency and goitre has, curiously enough, been known for over a century, but the facts were disputed and experiments discredited because it was found difficult to understand how such minute amounts of iodine as appeared to be necessary could exert any influence on human metabolism. Further, such large doses of iodine were given in attempts to find remedies for goitre that symptoms of poisoning were obtained. However, in the past twenty-five years, experiments on large groups have left no doubt that goitre is one of the results of iodine deficiency, and that the administration of small quantities of iodine to goitrous persons almost always has beneficial results. The active substance of the thyroid gland, thyroglobulin, has been found to contain a substance, thyroxine, which is a tetra-iodo compound. Over half the iodine of the human body occurs in the thyroid, but of the total thyroid iodine only about a quarter is found as thyroxine.

The iodine requirements of man are extremely difficult to determine because the amounts are so small. It has been stated that the quantity is of the order of 0·05 mgm. per day for an adult and perhaps three times this amount for a child. In experiments in goitrous districts the iodine has sometimes been supplied not daily, but intermittently, in which case very much larger quantities have been given. The admixture of iodine with salt for cooking and table purposes has become common, as a result of experiments in Switzerland in which iodised salt was used for the treatment and prevention of goitre in school children. For this purpose the ratio of iodide to salt was 1 : 100,000. Since then iodised salt of half this strength (1 : 200,000) has been used with success as a general preventive measure.

There has often been noted a relationship between the iodine content of water supplies and the incidence of goitre, though more recently the direct importance of this apparent relationship has been challenged on the ground

that the part played by drinking water as such in supplying iodine is relatively small. Goitre seems often to occur in districts rich in limestone, the water from many of these formations being low in iodine. Analyses of English water supplies have been given varying from about four thousandths of a mgm. per litre to less than a hundredth part of this.

Because of the small quantities present it is customary in recording iodine to use the value γ, which is 1/1,000 mg. Fresh water usually contains between 0·12γ per litre, though mineral well waters sometimes are very rich in iodine.

Iodine Content of Foods

Although the drinking water supplies of a district may not contribute very much directly to the iodine intake of the population, they may often be taken as an index of the iodine level to be expected in the food materials, both animal and vegetable, obtained in that district. For example, in the State of Minnesota the most goitrous regions lie in the north-east, where the iodine content of drinking waters may be as low as 0·01γ per litre. From these regions the average iodine content of many samples of cabbage was 111 per kgm. dry, and of potatoes 101 per kgm. dry. In the south-western areas of the same State, where goitre is much less frequent and the water supplies contain between 0·05γ and 0·147γ per litre, cabbages were found to contain 174 per kgm. and potatoes 227γ per kgm. (McClendon and Holdridge). Plants possess the property of concentrating iodine in that water is evaporated from the leaves, but even so the iodine content of the plant is directly related to that of the soil on which it grows. Pasture grass has been found to vary widely, from 26 to 500 γ per 100 gm. having being recorded for English samples. The iodine content of milk similarly depends on the iodine in the forage. Figures commonly obtained fall within the limits of 20-70 γ per litre. In goitrous areas much smaller amounts sometimes occur. The iodine in milk may be enormously increased by the addition of iodide to the food, and iodides are not infrequently supplied in supplementary mineral rations to stock.

Amongst foodstuffs, the richest sources of iodine are marine products, sea fish, shell fish, and liver oils. Freshwater fish are ordinarily distinctly lower in iodine content, as might be expected. The amount of iodine in vegetables is very variable, and dependant on local conditions, as explained above. Watercress seems to be one of the richest sources of iodine commonly met with amongst plants, contents of 20-45γ iodine per 100 gm. fresh weight having been recorded. Other vegetables, such as lettuce (1·6γ per 100 gm.) and cereals—*e.g.*, wheat (0·2-6γ)—are low. Fruits commonly contain very little iodine. Meat also shows considerable variation in iodine content from 1·2-9γ per 100 gm.

Fluorine and iodine provide a most interesting contrast in their effects, though the amounts concerned are not of quite the same magnitude. The danger limit of fluorine in waters may be expressed as 1,500-2,000 γ per litre, whereas the iodine usually found in waters of non-goitrous districts is far less than this, as has been mentioned.

A Suggestion

Whether fluorine in minute traces is essential is unknown; no evidence supporting such a view has ever been obtained. On the other hand, iodine has detrimental and even toxic effects when supplied in excess for any length of time. However, because of the natural distribution of iodine there is no risk of obtaining too much iodine in any possible dietary, and the steps to be taken in the event of iodine deficiency are obvious and simple. It should, however, fall to local medical authorities rather than individuals to undertake remedial measures either by insisting on the use of iodised salt in iodine-deficient areas, or by adding suitable quantities of iodides to the drinking water supplies at frequent intervals. There is reason to suppose that the former is the more effective measure. Food manufacturers might consider whether in the interests of general health iodised salt might not be generally used in all processes requiring salt.

TURBIDITY IN SUGAR PRODUCTS

Turbidity in Sugar Products. The Preparation of Raw Sugar Solutions for the Determination of Colour and Turbidity. F. W. Zerban and Louis Sattler.

In a study of the factors affecting the simultaneous determination of transmittency and Tyndall beam intensity of raw sugar solutions with the Pulfrich photometer, to derive the colour and turbidity concentration, it has been found necessary to standardise both the dry substance concentration and the depth of layer of the solution to be measured. When dark sugar products have to be diluted with white sugar syrup, the two should be mixed first and filtered afterward. The optical readings should be made about two hours after the preparation of the solution, to allow colloid equilibrium to be established.

In a search for a filtration procedure which would remove turbidity quantitatively, without affecting the colouring matter, several filtering agents were tried. Asbestos, filter cel, and silica gel have been studied more particularly. It has been shown that all three of these remove both turbidity and colouring matter at the same time, both of them selectively. Silica gel is most effective in taking out total dispersed material. There is little difference in this respect between filter cel and asbestos, provided that the latter is used in the form of a tightly packed pad. The filtrates obtained with any of the three filtering agents contain turbidity, as judged by the Tyndall effect, and colouring matter in about the same ratios. It is not possible to remove turbidity by means of any of them without removing colouring matter at the same time, and the choice between the three filtering agents becomes a matter of agreement. Proposals are made to serve as a basis for such an agreement.

Abstract of a paper given by the authors at the meeting of the Agricultural and Food Chemistry Division of the American Chemical Society held at Kansas City.

MILK CONCENTRATES III.

EVAPORATED AND DRIED MILK

In the third and final contribution Dr. C. Knoch (of Rohr, Stuttgart) describes the processes of manufacture of evaporated and dried milk, and concludes with a discussion of the principles involved in the production of dried milk in the most suitable forms for present and possible future uses.

MANUFACTURE OF EVAPORATED MILK

THE METHOD of production of sweetened condensed milk also forms the basis for the manufacture of non-sweetened concentrates. But since the requirements of the trade regarding the pure evaporated milk are quite different to those for sweetened milk, plant and methods must differ in many features.

Whereas the addition of sugar as a preservative modifies the flavour and the scope of application of condensed milk and restricts its market in some measure, the chief outlet for pure milk concentrate (containing no additional ingredients) is in districts totally deficient in milk, where the preserved product is welcomed solely because of its milk-simulating characteristics.

Methods and plant necessitated by the addition of sugar (melter, mixer, crystalliser, etc.) are therefore omitted in the production of pure concentrate which instead demands sterilising equipment for maximum retention of the milk-like properties. As pointed out at the outset, the sterilisation of natural liquid milk was technically carried out 100 years ago, but the process did not acquire practical or economic significance owing to the technical defects in the process on the one hand and the rather high water content on the other. With a view, at any rate, to rendering the process more economically feasible by reducing transport costs, efforts were later made to sterilise vacuum-concentrated milk, but this led to further modification of the natural milk character in proportion as more water was driven off. Sterilising methods applied at the present day on a large scale do not permit the concentration to proceed beyond 50 per cent. of the original volume without causing the product to turn brown, to acquire a burnt taste, to deposit sediments, to develop flakes, lumps, and clots, and even to impart a general clotting tendency to the entire mass.

A complete lay-out of equipment for producing evaporated milk is shown schematically in Fig. 18, in which the milk is processed in a vertical direction and therefore without intermediate fitting of pumps or other lifting devices. This vertical arrangement is not in any way an indispensable condition for the production of evaporated milk in particular, but has advantages over the horizontal layout in all other milk-processing operations, and is a potent factor in safeguarding the milk.

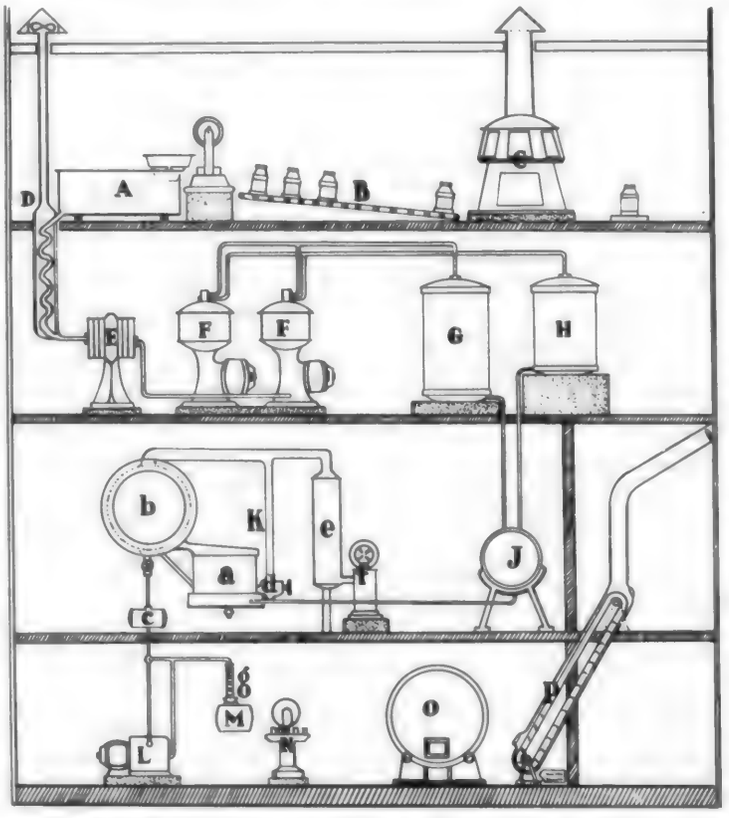


FIG. 18.—Layout of equipment for evaporated milk plant.

The milk is first of all tested, weighed, and discharged into the storage tank A, whence it is distributed by gravity into the factory. The empty cans proceed by way of the roll-way to the cleaning plant C, after which they are returned via the lift to the lorries at the reception platform. The milk flows from the storage tank A into the fourth floor through the serpentine channel enclosed in the de-aerating channel and then directly into the heating ap-

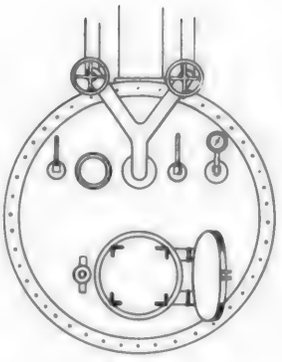


FIG. 19.

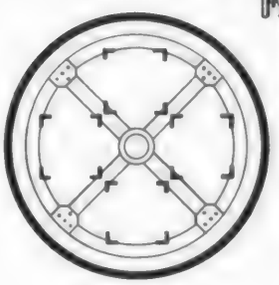


FIG. 20.

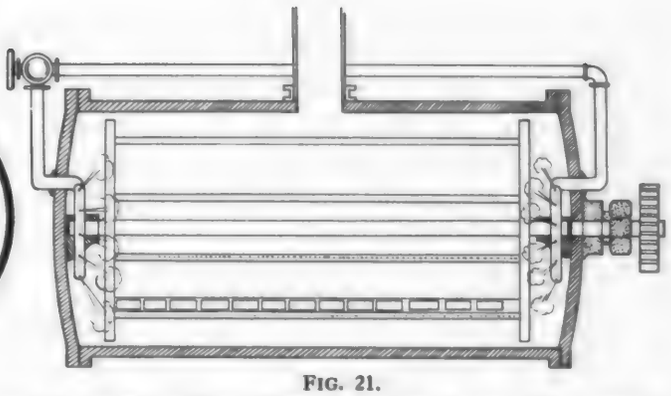


FIG. 21.

The three figures show the construction of a sterilisation vessel as described. Figure 19 illustrates the end cover with steam-tight inspection door, sight-glass, steam and water controls, thermometers and pressure gauge. In the centre (Fig. 20) is a diagrammatic representation of the revolving framework receiving the baskets of tins. The third section (Fig. 21) shows steam and cooling water supply and end drive.

paratus E (plate-pasteuriser, or the like), then into the separators F F, where it is cleaned and the cream separated. The skimmed milk is collected in tank G and the cream in H. The separation, of a part of the milk at least, is a necessary preliminary to standardisation to the required fat content by blending in tank J.

The condensing plant K on the second floor is conceived on completely modern lines: Heating unit (*a*) on the outside, horizontal evaporating boiler (*b*), condensate collector (*c*), vapour heating nozzle (*d*), condenser (*e*) and small air-suction pump (*f*). On the ground floor the condensate is either homogenised by the machine L as required, or passed immediately over the surface cooler (*g*) before entering storage tank M. In the filling plant (*n*) it is immediately filled off into the thoroughly cleaned tins, which are mechanically closed by folding over the lid or (following the older practice) by soldering. The tins are preferably packed into the baskets of the steriliser, which are then pushed into the sterilising chamber O, where they are heated by direct steam and rapidly cooled by an atomised water spray. To ensure uniform and rapid heating and cooling of the milk it is now almost invariably the practice to use sterilisers, maintaining the tins in constant movement throughout the entire process, thus avoiding the lump formation and non-uniform heating that may easily occur with motionless tins. Transference to the warehouse, as shown in Fig. 18, proceeds via an air-heated elevator P enclosed in a channel wherein the tins dry out. They are usually kept in the store for a few days or weeks until, shortly before despatch, they are tested for absence of leaks by an automatic shape tester or by hand. They are finally labelled, wrapped, and packed into cases.

For the operations up to bringing into the warehouse and those up to the stage when the tins are ready for despatch, a comprehensive range of equipment is available to suit any size of factory. On the other hand, sterilisation, possibly the most important stage in the production of a high-quality product, still calls for further discussion.

Of greatest interest are the plants for medium outputs of 5,000 to 25,000 tins per day, which are usual in European factories. An example of this class is shown in Figs. 19, 20 and 21: a large enclosed horizontal iron vessel with a steam-tight charging door, inspection windows and other fittings, together with a steam withdrawal tube, which can be completely cut off by a steam-tight sealing cover. On the sloping floor of the boiler the heavy axis of the rotatable stand projects forward (shown in section in Fig. 21) and carries the guide rails between the loaded baskets, which are pushed in and kept in position. The baskets are constructed of two square head sheets held together at the four corners by angle irons. Tubes are provided as a support for each series of tins, and the row of tins is kept in position from above by a third tube passing through the head plates. The filled baskets, standing upon a trolley waggon, are so pushed before the charging door of the vessel (Fig. 19) as to permit them to run on their rollers between the four guides of the rotating platform. Once the latter is fully charged and the door closed, it is set in motion by switching on a motor on the laterally projecting axial base (6 to 10 revs. per min.), and steam is passed into the vessel through the partially opened sealing cover. Fig. 21 is a longitudinal section through the front wall of the vessel and shows how the steam flows through an annular tube containing numerous nozzle-like perforations surrounding the axle bearing and enters the vessel from the centre of the head walls. It passes along the base of the tins, sweeping out the air, and passes out through the vapour flue with the aid of the suction from the blower from the outer side of the flue. About 12 to 15 minutes are required to bring the contents of the tins to a constant temperature of 105° C. The sealing cover is closed gradually and tightly with the temperature about 100° C.

As more steam is admitted the internal pressure is allowed to increase to about 5 lb. per square inch, and the temperature between 105 and 110° C. (221-230° F.). This temperature must be maintained for 25 to 30 minutes on the continually rotating tins, after which the steam is withdrawn, the blower started up, and cooling water simultaneously sprayed in through the annular nozzles evaporates immediately on coming into contact with the hot tin bases and is drawn off through the blower. The external temperature of the continually agitated milk rapidly falls, and after as little as 10 to 15 minutes the baskets can be removed from the steriliser and brought down to the desired storage temperature by air-cooling.

FIG. 22.—The lower part of the drying chamber and powder separator for the spray drying of milk. (By courtesy of Kestner Evaporator and Engineering Co., Ltd.)

PRODUCTION OF DRIED MILK

At the very start of this article attention was drawn to the main objective of all technical de-watering processes—namely, to obtain a product convertible at any place and at any time into a liquid equivalent to the original milk in every respect by simply adding the requisite quantity of water.

But as it subsequently turned out, the attainment of this ideal would only be beneficial to the milk industry and the public welfare if production costs could be brought into line with the low value of raw milk, chiefly by reduced transport and packing costs.

To these two essential factors influencing the dried milk industry is now added a third and hitherto overlooked factor—that is, the form and manner in which dried milk should be introduced to the consumer to ensure the most favourable reception.

Production of first-class products demands above all an extremely rapid, almost instantaneous, drying. Instantaneous high-temperature heating causes practically no modification in the liquid milk. The sudden drying of atomised raw milk particles leads to separation of milk flakes representing the ideal of a dried milk in almost every respect. And if the raw milk is not concentrated in a hot-air stream, but is allowed to volatilise suddenly upon heated glass plates in the form of a mist or an extremely thin layer, the residual crystalline lustrous scales form a dried milk, swelling up completely in any quantity of water and yielding a liquid not distinguishable in any way from the original milk. To effect this instantaneous evaporation there are three methods available at the present day, all of which aim at rapidly transferring the heat to an infinite number of infinitely small particles from which the water is withdrawn and swept away in the vapour stream: (*a*) Spraying into hot air (drying tower, Fig. 22); (*b*) evaporation of a milk paste film upon steam-heated horizontal metal rollers (Fig. 23); (*c*) "dew-drop" drying in vertical rotating glass-lined drums (Fig. 24). If apparatus of these types are to be used in the concentration of fully liquid milk at a low temperature (about 65° C.) their efficiency would be reduced to a level far below the economical limit. For practical use, therefore, a compromise has been effected with vacuum evaporation, which permits much more economical withdrawal of water from raw milk to the extent of half to one-third its volume (as in the case of evaporated milk), so that only an additional 37·5 kilos water require to be driven off from 100 litres of fresh milk by drying in the open air instead of 87·5 kilos water. Pre-thickening to a greater extent proves undesirable owing to the considerably prolonged heating period, while the increased viscosity is a drawback to atomisation of film-drying on rollers. Furthermore, intensified pre-thickening retarded drying out, and the consequent defects are reflected in the final product which still cannot reach, in factory practice, the high degree of perfection achieved on the laboratory scale with dried milk evaporated upon warm glass sheets.

So long as the laboratory results cannot be economically translated to industrial practice we must content ourselves with the compromise method, and by its further refinement

FIG. 23.—Roller-drying plant.

FIG. 24.—Dew-drop drying plant.

endeavour to obtain a product approaching as close as possible to the laboratory ideal.

Economics of Milk Drying

In the laboratory attempts have been made for a long time to produce the ideal dried milk by a different method and have actually succeeded as, for example, by freezing out the water or decomposing it with an electrical current. But all these methods were entirely out of the question for large scale production owing to their high cost, even compared with the most expensive method of water removal by evaporation or boiling. It cannot be denied that the existing industrial contrivances for heat utilisation have been refined to the utmost, for they consume only a fraction (in some cases only one-fifth) of the thermal requirements necessary a decade ago. In fact, modern plants are so economical in fuel cost that they can even be installed in the smallest dairies without over-burdening them.

At the present time only a relatively small capital outlay is required to install a completely automatic, small desiccating plant in a dairy with the aid of which—and without increasing the size of the boiler, the space, or the payroll—the daily excess of milk can be converted almost automatically into a stable product highly suitable for a variety of nutrient purposes. This plant may eventually represent a revolution in dairy routine similar to that caused sixty years ago by the introduction of the milk centrifuge.

An example of this type, affording exceptionally low running costs, is shown in Fig. 25. In the vessel A, fitted externally with heating coils and with internal intermediate partitions, the milk is maintained at 63° C., for 30 minutes by the vapours from the drier B (in the housing C). The intermediate partition divides the milk running in from the raw milk storage tank into two unequal portions, the larger of which eventually flows into the condensing apparatus D, comprising heating element (*a*), evaporator (*b*), and vapour tube (*c*), and immediately fills up with a second batch of raw milk, while the first quantity is thickened to one-fifth its volume by the steam jet apparatus (*d*). This takes place within 30 minutes, in course of which the continually evaporating water is renewed by inflow of raw milk kept in A at a temperature of 63° C. As soon as the first portion has been concentrated to one-fifth (the second portion being continually drawn in) the apparatus (*e*) withdraws the concentrate (which is now of uniform composition) from the condensing apparatus at intervals of 15 to 20 seconds and throws it into the storage tank (*f*) into which has also flowed the smaller portion, which has been pasteurised for 30 minutes in the tank A.

There results a thickened milk blend containing about 62·5 per cent. water, a concentration, therefore, which, in the light of the foregoing remarks on sterilisation, tolerates prolonged heating at over 100° C. and possesses

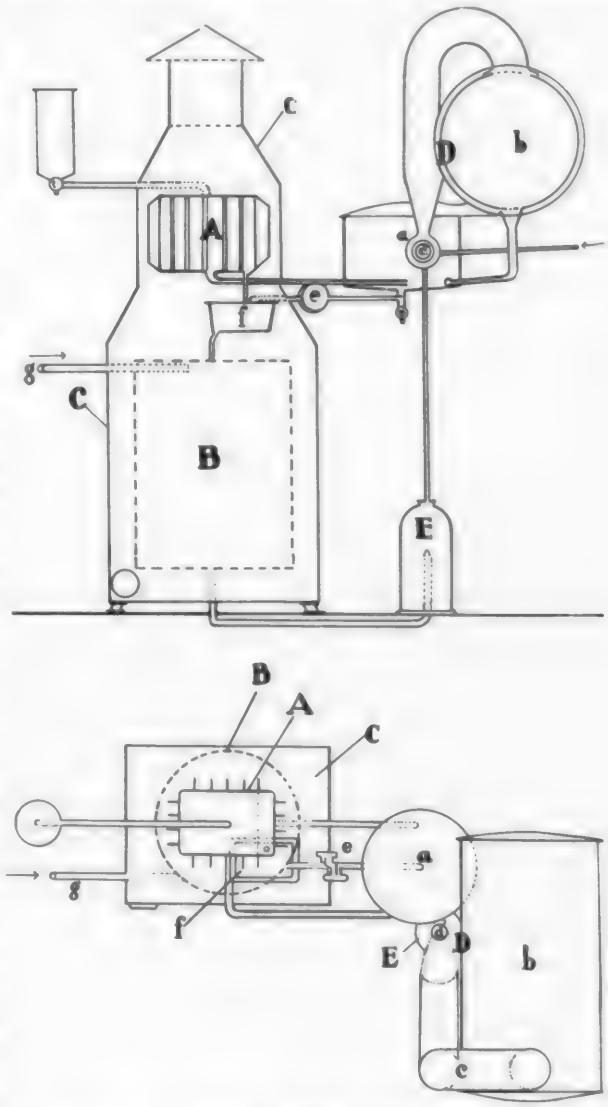


FIG. 25.—Diagram of rapid drying process plant.

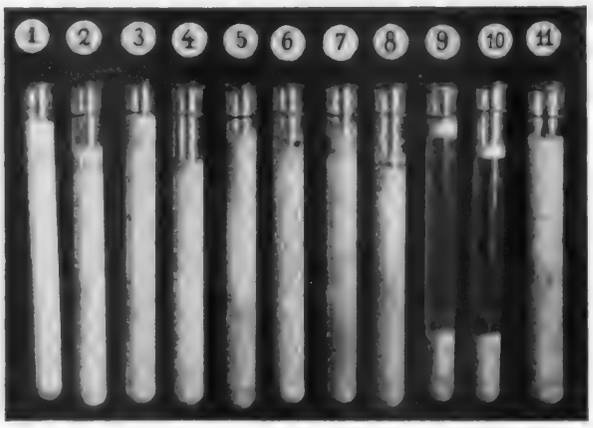


FIG. 26.—Sample solutions showing the solubility of various types of dried milk.

a viscosity permitting atomisation or passage in an extremely thin film over drying rollers—*i.e.*, which is only suitable for instantaneous drying in a suitable drier B located in the housing C, the vapours of which warm the raw milk in the ribbed tank A (ribbed for condensing) and brings the concentrate in (*f*) to a suitable drying temperature. The boiler steam or waste steam, if available, flows through the tube (*g*) to the drier, while its hot condensed water flows into the bowl E, where, by means of a nozzle, it is sucked into the steam jet apparatus (*d*) and sprayed in such a manner that it can be used, in addition to the vapours from (*b*), for heating (*a*).

There is thus effected a continuous circulation of steam throughout the whole system, and once in operation the condensation only requires sufficient heat to raise the milk temperature by 3 to 4° C., and to convert it into vapour form as well as to dry a quantity of condensate by raising its temperature by about 20 to 25° C. Heat is also consumed in transformation into vapour form of only about 40 per cent. of water in the raw milk. Since the temperature of the milk is only kept for a maximum of 30 minutes at a temperature not exceeding 63° C., the process is suitable for making a product retaining to an exceptional degree the original properties of the raw milk, and is as good as, and possibly even better than, raw milk for nutrient purposes as well as for medical and technical products.

Principles of Dried Milk Manufacture

With intelligent application of what has been already said on the subject of milk concentrates it should not appear difficult to organise a method and plant culminating in the production of first quality dried milk, although once again it must be stressed that the technical aids now available do not permit permanent fixation in the concentrate of all the chemical, physical and physiological properties of raw milk. To be truthful, all these properties are more or less lost or transformed in one stage of processing or another. How far the transformation goes and its fundamental causes are points on which precise information is impossible in this paper.

Reference may be made in brief to the enormous

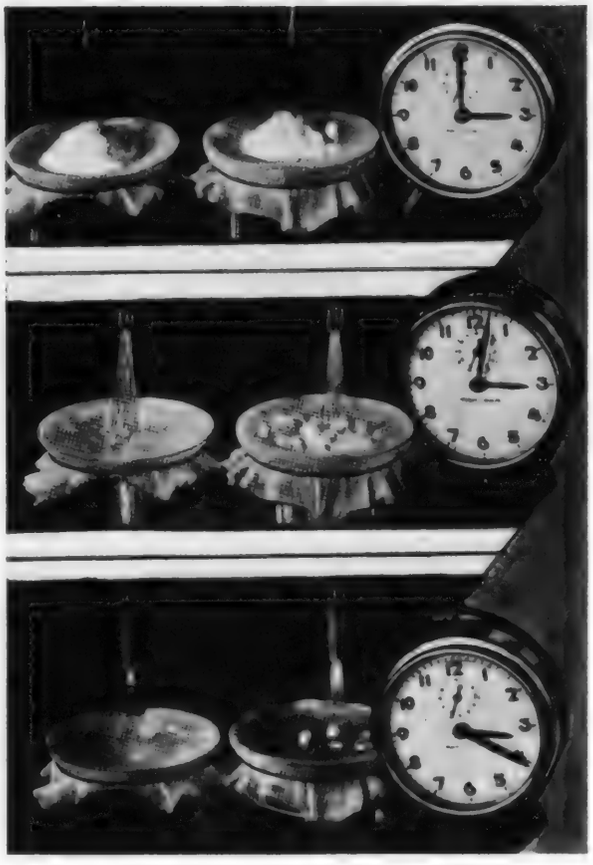


FIG. 27.—Test showing the influence of structure on solubility.

influence of the process of manufacture upon the so-called solubility of the dried product. The sample solutions in Fig. 26 were made up with products from different sources (2 gm. in 20 gm. water) with vigorous shaking (the even numbers 2, 4, etc., in hot water and the odd numbers in cold water). After standing for many hours the deposits varied in quantity and compactness as well as in respect of the "cream layer" (dissolved hot with a pale butter layer) —with the exception of No. 11, an American *skimmed* milk powder. Not a single sample reproduced the smooth, homogeneous appearance of fresh milk! Samples 9 and 10 merit special mention; like the others, they were about 6 weeks old, but were not kept in closed tins, but in the "open" condition in shops. Whereas Fig. 26 demonstrates the varying *degree* of solubility of 5 milk "powders" prepared by different methods, Fig. 27 reveals the influence of structure upon the *rate* of dissolution. The filter cloth on the left is covered with granular (Fig. 30*c*) milk and that on the right with dust-fine dried milk. Both small piles (of equal weights) were dissolved by a water spray directed upwards and swept through the muslin. The coarse material was washed through within 2 minutes, but the fine powder had not completely passed through even after 20 minutes. The correct structure is also of outstanding importance for other practical purposes, such as packing and compressing. Two examples may be considered: Fig. 28 shows how much greater must

FIG. 28.—Test showing the influence of structure on volume.

be the packing space for a granular product (left) than for a floury product; but if both sorts are compressed to half their volume, the cube (Fig. 29) obtained by compressing the dust-fine material cannot be rapidly and completely dissolved or brought into suspension by pouring over the appropriate quantity of water or by immersion in water.

The influence of structure upon the behaviour of dried milk during dissolution and compressing can be understood by examining the shapes of individual particles under a microscope.

Fig. 30*a*.—Sprayed milk granules: the hollow spherelets rapidly absorb the maximum quantity of water, their coating disintegrates with formation of a paste retarding further penetration of water. Compression is rendered very difficult by the relatively enormous quantity of water within the spherelets; the compressed product is only held together under enormous pressure, is extremely hard, and can only be brought into suspension very slowly with the aid of a large quantity of water; without fine comminution it is practically impossible to dissolve further.

Fig. 30*b*.—Roller milk granules: coarse, hard blocks with relatively very small surfaces for contact with water; compression is fairly easy with disintegration of the blocks and clogging of the pores to prevent water penetration; the compressed material is therefore soluble with great difficulty even when previously broken up.

Fig. 30*c*.—The perforated thin skins with crepe-like undulations offer an enormous surface to the water in comparison to the mass: hence immediate disintegration of the compressed material which can be easily broken down by rubbing.

Why, then, are we interested in the behaviour of different types of dried milk during compression? Because we venture to regard compressed milk as *one of the most important future commercial forms of dried milk*. It keeps better than ordinary milk powder in barrels, is the most practical form for transport, and can be hygienically divided into portions corresponding to the usual liquid quantities. There are already available some very efficient machines for automatic packing of the cubes into a cube-shaped wrapping of specially suitable paper cut from a roll and tightly sealing the wrapping and labelling it. This is not merely the ideal export form of milk owing to the notable saving in packing and transport costs, but we may be approaching the time when small milk cubes will be used with a cup of tea or coffee. Nor should infant's milk in cubes be regarded any longer as a Utopian idea.

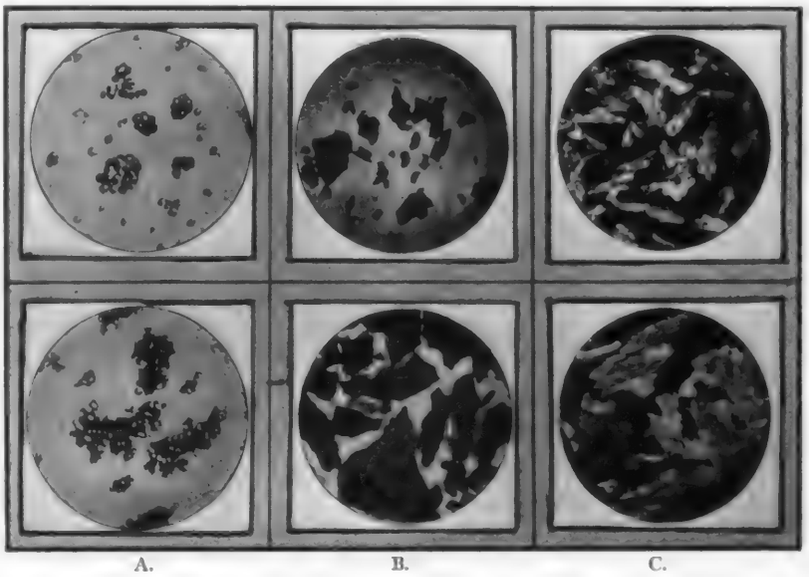
FIG. 29.—Test showing the influence of compression on solubility

The entire dairy industry and national economy in general would, indeed, derive the greatest advantage from the adoption of skimmed milk for general culinary use through the medium of milk cubes. The present day utilisation in the liquid form can never give the producer the value corresponding to the nutrient value, since the consumer is not in a position to utilise the maximum food value owing to the high water content. According to König's nutrient value computation, there are obtained on the average from the manufacture of butter from 100 kilos full milk:

4 kilos butter with 10,300 food value units.
85 kilos skim and butter milk with 18,275 food value units.
8 kilos dried milk with 18,960 food value units.

But out of the approximately 18,000 food value units there are only obtained one-fortieth of the money value in liquid skimmed milk, while an equal number of food value units in dried skimmed milk is only equivalent to one-twentieth of the money value of the roughly 10,000 food value units of butter. For cooking, this disproportion in the valua-

(*Continued on page* 16.)



A. B. C.

FIG. 30.—Grains of dried milk. Upper series: Fluid raw milk. Lower series: Precondensed milk. A, Spray process; B, roller process; C, dew-drop drying process.

Cereal Chemistry in 1936

By T. H. FAIRBROTHER, M.Sc., F.I.C.

(Chief Chemist, McDougalls Limited)

AT THE end of his review on Cereal Chemistry for 1935 in FOOD MANUFACTURE the writer stated that "slowly and surely facts are being assembled, evidence produced and fresh discoveries made, so that we are getting nearer to a real understanding of the problems involved in the production of our daily bread". In the twelve months that have elapsed since this opinion was expressed events have happened, fresh researches been initiated and more results obtained which bring us still nearer to a solution of our problems, or, at any rate, enable us to get a clearer picture of the very wide field embraced by the rather vague and inadequate term Cereal Chemistry. Just as tangible objects suddenly loom into our vision as we approach them in a fog and begin to take some definite shape and entity, so experiments carefully planned and executed slowly and methodically are bringing facts out of the mist of speculation into the concreteness of the understood.

Apart from the general forward advance and the attack on the broad front, the year has had its own problems and difficulties which have had to be dealt with by cereal chemists, millers, and bakers. The international wheat situation has been difficult. There has been a shortage of Plate wheats and substitutes have had to be found. Millers had to have recourse to low-grade Manitobas, and increase the amount of Australians, and this has had to be done carefully so that the change has not been too abrupt and the alteration in the characteristics of the grist too noticeable. These, of course, are normal difficulties that are liable to occur in any season. This year we have been able to deal with our problems more easily because of our gradually growing knowledge of certain fundamentals.

There has been an increasing use of standard mechanical methods such as those recommended by Brabender; the farinograph and fermentograph have been adopted by a number of laboratories, and the results obtained by the use of these machines have done much to elucidate many problems of grist, conditioning, fermentation tolerance, and others. It is not suggested that Brabender's are the only machines employed. In a very illuminating paper published in March, 1936 (*Cereal Chemistry*), C. O. Swanson describes a number of physical tests to determine quality in wheat varieties. He has compared results obtained by the Chopin Extensimeter, the Bühler Comparator, the Brabender Farinograph, and the Swanson-Working Recording Dough Mixer. Of these, the first two are designed to test mainly the elasticity or the extensibility of the dough. The last two are intended to test mainly the rate of dough development and the behaviour of dough under the stress of prolonged mechanical action. These physical methods were also employed by Kent Jones and Geddes in a co-operative study of the different methods for evaluating flour strength (*Cereal Chemistry*, May, 1936). As a result of this, Kent Jones stated that "his collaboration emphasises his suggestion that there is more hope of standardisation along the lines of mechanical dough measurements than in standardising the baking test on the lines of the American Standard baking test." This opinion, backed by careful comparative collaboration upon which it was based, leads us to the hope that soon we may be able to have, not merely inter-laboratory comparisons, but also international standards. The farinograph was also used by Sullivan, Near and Foley (*Cereal Chemistry*, July, 1936) to demonstrate the harmful action of wheat germ on the baking quality of flour and the constituents responsible for this effect.

Testing Flour Strength

In view of the increasing attention paid to mechanical methods, the reviewer feels justified this year in devoting prime attention to developments in this direction. One very interesting section of this is the work started by Schofield and Scott Blair on the physical properties of dough in which methods analogous to those employed in the testing of metals are used. Work on these lines is being continued by Halton and Scott Blair, and one hears that very promising results are being obtained. Of the various properties measured, it appears that the viscosity and the rigidity modulus are of major importance, and it seems to be established that good bread-making quality is associated with a relatively high viscosity and a low modulus. The relaxation time, which is the ratio of these two properties, according to this work, appears to be the chief single criterion of quality. The researches of Schofield and Scott Blair have been published in the Proceedings of the Royal Society, and they certainly seem promising.

Giovanni Issoglio (*Chem. Abs.*, 1935, vol. 30, 1131) has devised an instrument for testing the physical properties of bread dough, called a "tension hysterometer". It measures the hysteresis of the dough after tension has been applied, and thus affords a measure of the viscosity and modulus of elasticity. A comparison of graphical and numerical methods for the evaluation of farinograms has been made by Kopetz (*Mühlenlab.*, 1935, vol. 5, p. 97). He believes that the so-called Vienna process, in which the potential baking quality is calculated from planimetric measurements which embrace all the properties shown by the curve, is superior to the Hungarian process, in which planimetric measurements of the degree of weakening are combined with the dough development time and dry gluten content for calculation of the baking quality. The fermentograph has been used by Gründer (*Mühlenlab.*, 1935, vol. 5, p. 73) to determine the fermentation charac-

teristics of different millstreams, and he suggests that the data obtained, together with the percentage distribution, can be used to calculate mixtures with the desired reserves of gluten strength and fermenting power.

Some very interesting work is being done by Bungenberg de Jong at Utrecht. About a year ago the writer had an opportunity of discussing de Jong's colloid chemical interpretation of farinography with him, and recently (*Mühlenlab.*, 1936, vol. 6, p. 23) de Jong has published his theory. According to it the farinogram is a work-time diagram, every point of which represents the sum of the energy processes in play at any given moment during mixing, and hence it gives some information about the colloidal properties of the system. Changes in the degree of swelling of the colloids, say, due to the introduction of electrolytes, are reflected in the shape of the curve and a shifting of the more or less clearly defined maxima representing mixing, swelling, and adhesion.

The Fornetograph

Another device for recording the expansion of a fermenting dough has been described by Ihlow (*Mühlenlab.*, 1936, vol. 6, p. 65). It is called the "Fornetograph". It is said that the curves obtained before and after punching the dough give information as to the relative diastatic activity, sugar formation, gas production and retention, gluten quality and baking quality of flours. The apparatus has also given good results in testing the fermenting power of different yeasts and the effect of chemical improvers and diastatic supplements.

A number of experiments have been carried out on the Chopin Extensimeter. The work of Feyte (*Chem. Abs.*, vol. 30, p. 169) is interesting. According to this, differences in the mechanical properties of gluten, as measured by the Chopin Extensimeter, are dependent on the hydrogen ion concentration of its medium, and are partly dependent on its non-nitrogenous content. A substance of unknown chemical nature, which is not removed by ether extraction and which reacts to treatment with sodium sulphite, sodium bisulphide and potassium cyanide gives gluten its physical properties. Apparently cystine and cysteine play an important part in these reactions. Potel and Chaminade (*Compt. rend.*, vol. 200, p. 2215) have made measurements of oxidation reduction potentials of flour, and these potentials can be correlated with Extensimeter measurements. Chopin (*La Meunerie Française*, vol. 51, 276) has described a recording dough mixer which delivers a sheet of dough of uniform consistency and of the proper thickness for testing in the Extensimeter. The accuracy of the instrument is increased considerably through the use of dough sheets thus prepared.

Gliadin-Glutenin Ratio

The old speculation of a gliadin-glutenin ratio has been revived by Fleurent (*Chimie et Industrie*, vol. 35, p. 507). He has developed the theory that the plastic properties of dough are dependent on those of the gluten and that the latter, in turn, are dependent on the ratio of gliadin to glutenin, the optimum ratio being 3 : 1. If the gliadin content is excessive the dough expands well during fermentation but tends to flatten out in the oven. On the other hand, if the glutenin content is too high, the result is a hard, bucky dough which does not expand sufficiently during fermentation and baking. Fleurent's investigations of the effect of *p*H on the plasticity of doughs have led him to conclude that by varying the *p*H according to the gliadin contents of different glutens, the optimum baking quality can be obtained. The writer has always believed that there is something in this question of the gliadin glutenin ratio, and referred to it at some length in FOOD MANUFACTURE, June, 1928 ("Factors Influencing the Baking Properties of Flour"). Fleurent appears to be playing a lone hand in this direction, but he may be nearer the mark than many people think.

Enzyme Action and Fermentation

There has been a considerable amount of research work carried out on the problems of enzyme action and fermentation. In reference to amylases the work of the Myrbacks (*Biol. Abs.*, 1935, No. 13401) on the amylase of barley is worth noting. They state that barley amylase is an enzyme which is identical with malt amylase after admixture to the former of another enzyme (dextrinogen-amylase). Hanes (*Canad. J. Res.*, 1935, p. 185) has proved that beta amylase selectively hydrolyses one portion (about 60 per cent.) of the starch substance to maltose and leaves a non-reducing fraction (erythrogranulose). Hanes considers that alpha malt amylase does not exert a selective action upon the erythrogranulose fraction, but that it reduces the breakdown of both fractions, and in this case the reducing products do not consist exclusively of maltose. Page and Englis (*Brit. Chem. Abs. A.*, 1936, 110) have shown the effect of potassium cyanide on the rate of saccharification of barley at different *p*H values.

An important paper which throws new light on the proteolytic enzymes of flour, their activation by yeast and their inactivation by potassium bromate has been published by Jorgensen (*Cereal Chemistry*, 1936, p. 346). It shows that wheat flour contains powerful proteolytic enzymes. Usually these are latent, but activators (glutathione or yeast water), which, in themselves, do not possess proteolytic activity, are able to stimulate the proteinases of wheat flour. After the addition of an activator, such as glutathione, the wheat proteinases manifest their presence and strength in a very demonstrative way.

Balls and Hale (*Cereal Chemistry*, 1936, p. 54) have contributed a useful study on the proteolytic enzymes of flour. Their main conclusion is that during the process of dough fermentation the action of a proteinase in flour changes the colloidal properties of the wheat proteins. The change in the flour proteins eventually shows itself in the properties of the gluten. Proteinases usually produce first a coagulation of the protein; later the coagulated material is broken down and perhaps ultimately dissolved. If this is the case with flour in the first phase of proteolysis the gluten would probably become more tenacious; in the second phase it would be broken down to a thinner, more nearly liquid material. It would appear that a small amount of proteinase is beneficial, as it would prevent a dough from being too stiff and inelastic. A large amount, however, would be most undesirable. Balls and Hale, as

a result of their investigations, state that "it is now possible to give a satisfactory explanation of the changes that take place in the quality and behaviour of flours after they have been bleached or stored in air. This alteration of flour is due to a diminution of the proteolytic activity, brought about by the oxidation of the activator of the flour proteinase. Similar effects are produced when the oxidant is added to the dough as a "bread improver".

Enzyme Changes During Conditioning

There has been considerable controversy about the nature of the changes that occur during conditioning or any other form of heat treatment, and recent researches do not seem to have done much to clarify the atmosphere in this respect. Berliner (*Mühle*, vol. 72, 1033) has carried out a study on wheat conditioning, and has come to the conclusion that proteolysis is of minor importance even in doughs from flours milled from wheat mixtures containing sprouted berries and, further, that wheat contains no proteolytic enzymes comparable in activity to papain, pancreatin, pepsin, trypsin, or similar enzymes. Berliner believes that the softening of doughs from conditioned wheats is due to excessive starch degradation rather than proteolysis, and he explains the apparent increases in diastatic activity and gassing power following conditioning as being due merely to physical differences in the flour. Against this view Hopf (*Mühle*, vol. 72, 1129) states that Berliner's claim that dough softening is due to starch degradation is inconsistent with the fact that starch-free gluten washed from sprouted wheat flour becomes soft and runny on standing, in the same manner as dough. His theory is that the decrease in elasticity of gluten during rough fermentation indicates gluten degradation, and by reference to the results obtained by Ziegler (*Mühle*, vol. 72, 1035) on the Chopin Extensimeter and Farinograph, Hopf points out that the farinogram shows clearly at what temperature the gluten begins to break down under the influence of heat.

It is quite evident from a careful perusal of the literature on the subject that the problems of enzymatic influences on doughs are not yet properly understood. In course of time more data will become available, and these complex changes will become more clear. There is no doubt that proper conditioning does have a profound influence on the milling characteristics of certain wheats, and the writer thinks that in some cases a heat treatment is necessary to bring out the best properties of the wheat. Some millers do not believe in hot conditioning and still rely on damping wheat in the cold.

MILK CONCENTRATES

(*Continued from page* 13.)

tion can be corrected to some extent by using in place of the food value-quantities in the form of full milk the same or even an excess of this in the form of skim milk. If in place of 1 kilo full milk (containing 125 gm. dried substance or 337 food value units) there are used for a dish about 150 gm. of dried skim milk, the dish will contain 355 food value units; consequently more than would be got with 1 kilo full milk. But the average cost of this 150 gm. is only one-half or one-third of the cost of 1 kilo full milk. The producer simultaneously makes a better profit on these over-dosage packages of skim milk than would be possible with the liquid product.

Is this, then, the next objective of the dried milk industry to be kept in mind by dairies, both large and small? *First quality dried milk packed in portions*, including *full milk for export as well as condensed and evaporated milk and skim milk for cookery purposes* at home. The market for both products is so enormous that over-production would not be feared for a very long time even with an enormous increase in milk production. The product itself, the hygienic compressed milk, would undoubtedly be welcomed by the consumer, always assuming that it really retains the properties of raw milk. For apart from the probably lower market price, it surpasses all previous liquid or concentrated milk products in simplicity of use and storage and diversity of application and, above all, in flavour and food value.

The illustrations, numbers 7, 8, 9, 10, *and* 11, *published in the second part of this article in the December issue of* FOOD MANUFACTURE, *were of "Astra" equipment, the sole agents in the United Kingdom being the Dairy Supply Co., Ltd., London, N.W.* 10.

UNITED STATES STANDARDS FOR FRUIT JUICE, MOLASSES AND CHEESE

NEW definitions for fruit juice beverages and revised definitions for molasses and cream cheese were proposed by the Food Standard Committee of the U.S. Department of Agriculture at its meeting from September 28 to October 2.

The proposed and revised definitions are:

Oranegade.—The beverage consisting of orange juice, sugar and water. It contains not less than 25 per cent. of orange juice. The acidity may be increased by the addition of lemon juice.

Lime Rickey.—The beverage consisting of lime juice, sugar and carbonated water. It contains not less than 7 per cent. of lime juice.

Molasses.—The product which remains after separating sugar from the clarified and concentrated juice of the sugar-cane. It may be "light" or "dark." It contains not more than 25 per cent. of moisture and not less than 55 per cent. of total sugars (sucrose plus reducing sugars). Reducing sugars are calculated as invert sugar.

Light molasses is molasses which contains not less than 62 per cent. of total sugars.

Dark molasses is molasses which contains not less than 55 per cent. of total sugars.

Cream Cheese.—The soft, uncured cheese made from curd obtained by the action of either lactic fermentation or rennet, or both, on milk enriched with cream. The curd, heated or unheated, salted or unsalted, is drained by gravity and light pressure. The finished product contains not more than 52 per cent. of water and, in the water-free substance, not less than 65 per cent. of milk fat.

BY-PRODUCTS in MEAT PACKING and their Utilisation

The text of a lecture given by OSMAN JONES, F.I.C., before the Food Group and the Birmingham Section of the Society of Chemical Industry at Birmingham University, on November 6, 1936. Published by courtesy of the Society of Chemical Industry.

IN OPENING his address the author indicated that in one short paper it was not possible to cover a subject of such breadth, and explained that he would confine his remarks to a general survey of the products and a more detailed description of one or two of them. He then continued:

"Broadly speaking, by-products may be divided into two classes, edible and inedible. Among the former are such articles as lard, oleo oil, and premier jus, used in margarine manufacture, edible offal, such as sweetbreads, kidneys, liver, etc. I do not propose to touch upon these articles. Inedible by-products form a much more formidable list, and a few moments' contemplation will indicate what a very important part they play in our daily lives. The following list is by no means comprehensive, it merely mentions some of the most important articles produced as side-lines of the meat packing industry.

Products from Wool and Hides.—All kinds of leather, brushes, binder for plaster, felt padding, woollen clothes, hair for upholstery, lanolin, etc.

Products from Sinews, Fat and Blood.—Blood meal, blood albumen, filler for leather, fertilisers, meat meal, oils, glue, case-hardening bone, gelatin, ointments, soaps, lubricating oils and greases.

Products from Glands and Viscera.—Rennet, sausage casings, gold-beater's skins, tennis racquet strings, clock cords, violin strings, surgical ligatures, and the very important group of pharmaceutical preparations.

Products from Bones.—Buttons, combs, umbrella handles, pipe stems, knife handles, knitting needles, steamed bone flour, meat and bone meal, false teeth, etc.

In certain districts in America, for example Chicago, the meat industry is carried out on a huge scale, and establishments intended to deal with one or more of the by-products are in operation in close proximity to the meat packing establishments. Every kind of by-product is subjected to efficient scientific control in specially designed factories. The situation in this country is somewhat different, for in many cases the by-products have to be collected over a wide neighbourhood and sent to central establishments. Factories dealing with such diverse substances as leather and pharmaceutical preparations may be hundreds of miles from each other. This fact has caused this country to lag behind the United States in the utilisation of some of the by-products, particularly the more recently discovered pharmaceuticals, the majority of which have to be imported. There is, however, a large factory in Holland which specialises in the preparation of gland products.

The working up of many of these by-products constitute in themselves separate industries, every one of which has its own highly developed technology. Among such may be mentioned the manufacture of leather, gelatine, oils and fats, soaps, wool and hair, and pharmaceutical preparations. But I intend to confine my remarks to a description of the more important pharmaceutical products and the manufacture of meat and bone meal and blood meal.

GLAND PRODUCTS: THEIR FUNCTION AND MANUFACTURE

The pharmaceutical by-products of the meat packing industry are immensely important to the welfare of mankind, since they are finding an ever increasing use in the field of medicine. Their production is of comparatively recent development, and is the direct outcome of scientific research and chemical control. Animals and human beings possess a number of glands, some of them ductless, and these glands exercise a great influence upon body processes by reason of their external and internal secretions. The more obvious organs and their functions were understood many years before the Christian era; for example, physicians even then knew something of the part played by the stomach, lungs, and intestines. From time to time certain organs were discovered which appeared to be quite unconnected with the body processes, and nobody knew what functions they performed. Research workers were misled by the then accepted theory that every gland must have an entrance or an exit, as for example the gall duct which empties into the intestines.

The discovery that quite a number of glands in the body had no apparent exit, and that they delivered their excretions direct into the blood stream, has had an enormously important effect upon medical technique, for it is hardly too much to say that these ductless glands are the masters of the body machinery, and defective operation by any one of them means the difference between normality and abnormality, or ill-health and good health in

human beings. It is not to be inferred that all illness is to be attributed to faulty work by the ductless glands, but many disabilities hitherto considered as incurable can now be remedied by the use of gland preparations, the source of which is the meat packing establishment.

These endocrine, ductless or internal secretion glands, are not situated in groups, but are scattered in various parts of the body. For instance, in the brain cavity there is the pituitary gland. In the throat, astride the Adam's apple, is the thyroid. Just over the kidneys are the suprarenals, frequently called the adrenals. Other ductless glands are the sexual organs, the testes and the ovaries, which manifest profound influence on the characteristics of the human organism.

Uses of Gland Preparations

The more important uses of the preparations from glands may be summarised according to Clemen* as follows:

Pituitary.—Surgery: prevents shock, relieves gas pains. Obstetrics: contracts uterus, expels fœtus.
Pineal.—Mental backwardness.
Thymus.—Rickets.
Thyroid (used in desiccated form and also in extract form—thyroxin).—Deficiency of the thyroid gland, simple goiter.
Suprarenal.—Heart stimulant, increases blood pressure. Styptic, stops blood flow. Snake bites.
Ovaries.—Yields ovarian extract and corpus luteum. Menstrual troubles; surgical and natural menopause.
Pancreas.—Yields insulin for diabetes treatment.
Parotid.—Replaces saliva in deficiency.
Parathyroid.—Cure of tetanus (caused by deficient parathyroid); paralysis agitans.
Kephalin.—Styptic, used in light surgery.

Essentials of Manufacture

The manufacture of pharmaceutical preparations of animal origin needs highly specialised technique. Certain steps in the preparation are, in general, typical for the majority of the substances. Speed is absolutely essential in the processing of the glands in order to prevent loss of the active principles as the result of autolytic changes. For this reason the glands are removed from the carcase as rapidly as possible after slaughter and immediately chilled. Freezing or wetting of the glands should be avoided. From the chilling room the glands pass to the trimming department, where they can be easily handled, the chilling having made them firm. The external fat is removed, the glands minced, and then desiccated under vacuum in dryers of the shelf type. It is most important to carry out the process at a temperature not exceeding 40° C., for above that point some of the active principles of the glands would be destroyed. Following desiccation, many products are defatted by solvent extraction. This is accomplished by the use of a solvent, usually petroleum ether, the fraction employed possessing a boiling point of under 40° C. The defatted material is then ground to a powder, and packed ready for the market.

In order that safe and satisfactory use may be made of these preparations, they must be manufactured to comply with a definite therapeutic reaction, and to be of uniform chemical composition. Such standardisation can only be secured by mass production, where the volume of the products warrants proper biological and chemical control. The tests are usually carried out upon guinea-pigs and dogs, and the potency of the product stated upon the label of the package.

Before closing this part of my subject, I desire to make a brief reference to insulin, which, as you are aware, is used in the treatment of diabetes. The discovery of insulin was made by Dr. Banting, a Canadian scientist, who extracted it from that portion of the pancreas known as the islands of Langerhans. He published the report of his work in July, 1921. Insulin is now manufactured upon a commercial scale, by the treatment of the pancreas with alcohol, followed by the purification of the extract by iso-electric precipitation methods.

Yield of Gland Products

Many of these endocrine glands are extremely small; some idea of their size may be gleaned by a glance at the accompanying table (Moulton†):

Gland.	*No. Per Lb. (Fresh).*	*Lbs. Fresh Per Lb. Dry.*	*No. Per Lb. Finished Product.*
Pituitary (entire gland) ..	180	5	900
Pituitary (posterior lobe) ..	2,000	6	12,000
Ovary (cow) ..	80	6	480
Ovary (hog) ..	144	6	864
Ovary (sheep)	600	6	3,600
Ovary (cow) ..	80	20 (corpus luteum)	1,600
Parathyroid ..	450	10	4,500
Suprarenal (cattle)	40	630 (epinephrin)	25,200

Extracts from other Products

Liver extract is one of the recognised cures for pernicious anæmia, but more recently the extract has been desiccated and used in the form of a powder. Desiccated hog stomach is also a valuable remedy in cases of pernicious anæmia, and is stated to be even more active than liver extract.

MEAT, BONE AND BLOOD MEALS

About 40 years ago some poultry feeders found that egg production was materially increased by the addition of crushed bones and scraps of meat to the cereal ration. Supplies were then very limited and could only be kept fresh for a few days.

When it became to be more fully understood what an important part was played by protein concentrates in the successful rearing of live stock, it became evident that

* *By-products in the Packing Industry.*

† *Meats through the Microscope.*

meat and fish products represented an important source of these substances, but for them to be available for general use they would need to be prepared in such a manner that they would keep fresh and palatable for a long period. The earliest meals, which although imperfect were a considerable advance upon the use of crushed bones and meat as such, were produced by treating the raw materials in a closed vessel with live steam pressure. The fat as it rose to the top of the digest was skimmed off. This live steam treatment involved loss of much of the valuable nitrogenous matter present in the charge, for this passed away in solution in the condensed steam. The residual solid consisted largely of the mineral matter of the bones. It was dried and ground; much of this product was marketed as fertiliser, its value as a feeding stuff being comparatively small.

Dry Rendering Process

An improvement in the quality of the product was brought about by the introduction of a method of dry rendering, by which the animal residues are treated in a steam-jacketed vessel fitted with stirring gear. As cooking proceeds as much as possible of the grease or fat is removed by a decanting cock, and when the charge is free from moisture it is removed from the vessel and either pressed into cakes or treated in a centrifugal machine with the object of removing a further quantity of the fat, the market price of which is higher than that of the non-fatty residue.

A plant of this type, if worked efficiently, should provide a meal containing not more than 12 per cent. of fat. It is a matter of great difficulty to reduce the fat below this point by this method. A disadvantage of the centrifugal process is the tendency for the production of an emulsion between the glutinous matter of the material, the fat, and the moisture, in the form of steam, produced in the hydro-centrifugal extractor. This emulsion is difficult to separate, and the residual greasy "foots" which settle out from it have to be returned to the cooking vessels with subsequent charges, and thus there is a still further increase in the amount of "fines" and ultimately of greasy "foots".

There is, however, another aspect of the matter; carefully conducted feeding experiments carried out on an extensive scale, both in this country and America, have shown that in nearly all cases an excess of fat is undesirable in the diet of live stock. Time does not permit of my going more fully into this subject now, but it may be taken as quite definite that if meat residues are to be used to the best advantage, they must contain a very low percentage of fat.

Extraction Process

The knowledge of this fact ultimately led to the evolution of the extraction process for the manufacture of feeding meat and bone meals. The principle of the method is similar to that employed in the solvent extraction of vegetable oils from crushed seeds, but rather more complex, because the raw material has in this case to be freed from a great excess of moisture before the solvent can do its work. Bearing in mind that the fat obtained from the bones, etc., is of greater monetary value than is the residual meal, it will be realised that the object of the manufacturer is to produce a meal of low fat content for the two reasons: (1) the fat is more valuable than the meal, and (2) fatty meat meal is a bad feeding material. Further the fat produced should be pale in colour, low in free fatty acid content, and free from impurity. High temperature cooking and undue prolongation of heating will bring about hydrolosis of the fat. These conditions should therefore be avoided.

There are two types of extraction plants which may be employed for this particular class of work. The first acts upon the principle of sweeping out the moisture from the charge by the vapour of the solvent, which is maintained at a higher temperature than the boiling point of water. The material is exposed to successive quantities of the solvent vapour until the greater part of its moisture has been removed. The second method, the cooking, or rendering, is carried out *in vacuo* and then the dried charge is washed with the solvent in liquid form; by these means the temperature (*i.e.*, steam consumption) and time are reduced to a minimum.

The plant consists of (1) the rendering vessel, which also forms the extraction vessel, (2) the still in which the solvent is recovered from the grease, (3) the grease tank into which the grease is passed from the still after being freed from the solvent. The cycle of operations is as follows: The charge of material, bones, offals, etc., is placed in the rendering vessel, which is fitted with stirring gear and is steam jacketed, the steam supply to the jacket is turned on, and the vacuum applied by means of an air pump. On the completion of the rendering operation, the cooked material is washed with three or four successive quantities of the solvent, usually benzine B.P. range 95-110° C. The washes are pumped into settling tanks, and from thence to the still, where the solvent is removed by boiling, the residual grease being pumped to the grease tanks for subsequent treatment. The residue, after the processes of cooking and fat removal, is ground to the desired fineness in a mill of the disintegrator type."

The food units of the two types of meat and bone meal are approximately as follows:

	Unextracted Meal. (Per Cent.)	*Extracted Meal. (Per Cent.)*
Oil	13·5	3·2
Protein	49·5	50·5
*Phosphoric anhydride	10·4	13·7

* Defined as "phosphoric acid" in the Fertilisers and Feeding Stuffs Act (1928).

EFFECT OF IRRADIATION ON VITAMIN A CONTENT OF EVAPORATED MILK

THE method of assay is described by Cannon and Hixson, *Ind. Eng. Chem.*, 1936, **29**, 1009, and it is shown that so long as the vitamin A is not destroyed by ozone, there is no difference between the concentrations of vitamin A present in irradiated milk and that which has not been so treated.

INDUSTRIAL NEWS

New Food (Defence Plans) Department

A Food (Defence Plans) Department is to be set up within the Board of Trade. This was announced by Mr. Runciman on November 28, and Mr. H. L. French, second secretary to the Ministry of Agriculture and Fisheries, is to be its director.

The new department will work in co-operation with the Minister for Co-ordination of Defence, Sir Thomas Inskip, as chairman of the sub-committee of the Committee of Imperial Defence on Food Supplies in Time of War, in order to continue and complete the formulation of plans for supply, control, and distribution of food for defence purposes. The new department will not be directly concerned with home production of food, that responsibility will remain the charge of the Ministry of Agriculture.

Mr. French has been second secretary of the Ministry of Agriculture since 1934. He is 53. He was appointed to the Board of Agriculture in 1901. In 1915 he was secretary to Lord Milner's Commission on home production of food. He was joint secretary to Lord Selborne's committee on agricultural policy in 1916 and 1917, and from then until 1919 General Secretary of Food Production Department. From 1930 to 1934 he represented Britain and Canada on the permanent committee of the International Institute of Agriculture, Rome.

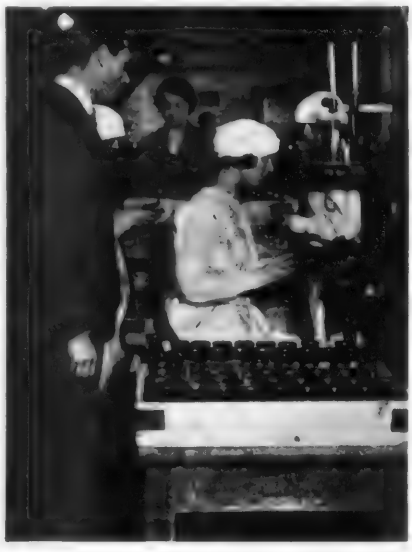
Mr. H. L. French, the Director of the Food (Defence Plans) Department.

International Trade

Mr. Charles E. Gardner, Chairman of Wm. Gardner and Sons (Gloucester), Ltd., chemical plant engineers, left Tilbury recently on the P. and O. steamer *Strathmore* for an extended tour in Egypt.

Mr. Gardner was met at Port Said by the firm's agent, Mr. Eady, and the two have planned an extended tour in the Near East. Mr. Gardner expects to return to England about the beginning of March. We have already heard from him on landing, and his main comment is that the weather, at that time, was insufferably hot.

Mr. Gardner, as our picture illustrates, is an alderman and an ex-Mayor of Gloucester.



His Majesty King George VI has always taken a deep interest in industrial processes, including those of the food industry. He is here shown during a visit to the Oxo factory keenly interested in the working of a labelling machine supplied by Purdy Patent Machinery Co., Ltd.

Mr. Kenneth MacLellan's New Post

Mr. Kenneth MacLellan, who was in charge of the Food Research Section at Lever Bros., Ltd., Port Sunlight, has now joined the staff of the British Cod Liver Oil Producers (Hull), Ltd. We understand from Mr. MacLellan that the works at Hull have been considerably enlarged, and will shortly be capable of doubling their present capacity.

Mr. Charles E. Gardner.

British Industries Fair

The Department of Overseas Trade has been notified by Earl's Court, Ltd., that, owing to unforeseen circumstances, the new Exhibition buildings now in course of construction at Earl's Court will not be completed in time to permit of them being utilised for certain sections of the British Industries Fair of 1937 to be held from February 15 to 26 next. The Department of Overseas Trade announce, therefore, that the London Sections of the Fair will be held at Olympia and the White City as in the case of the Fair of 1936. The Engineering and Hardware Section of the Fair will as usual be held simultaneously at Castle Bromwich, Birmingham.

OBITUARY

Death of Mr. W. H. Brownjohn

We regret to announce the death of Mr. W. H. Brownjohn, a director of Moritz Chemical Engineering Co., Ltd., and M. Senet and Co., Ltd., agents in the United Kingdom of de Deitrich et Cie and Etablissement Barbet, on Sunday, November 8.

Mr. Gordon Fell Clark Bereaved

Friends of Mr. Gordon Fell Clark, of Robert Ingham Clark and Co., Ltd., will learn with sorrow of the death of his young son Neil, on November 6. He was only four years of age. We tender our sympathy to Mr. and Mrs. Clark in their sad loss.

Food Section of Paris Exhibition

The committee which under the presidency of Monsieur Cotillon has been preparing plans for the food section of the 1937 Paris exposition has announced its first plans, and first sketches of buildings to be given over to food have also been published.

The section will be housed in two large symmetrical buildings at either side of the entrance in Champ de Mars. Every branch of the industry from production of farm products and foodstuffs to their manufacture and presentation will be shown. Every attempt will be made to render these presentations as attractive as possible.

The committee is making every effort to interest foreign food manufacturers in the section, and has decided that for the month of September a "Food Week" will be organised, during which especial attention will be given to showing food industries abroad.

Crosse and Blackwell's Extension

An important advance was made in Irish food industry developments recently when, in the presence of a distinguished gathering of industrialists and public representatives, Dr. James Ryan, Free State Minister of Agriculture, inaugurated production in canned and bottled products at Crosse and Blackwell's newly extended factory at Parnell Street, Dublin.

The new factory is a triumph of modern factory engineering—spacious, well lighted, scrupulously clean, and well ventilated on the most up-to-date plan.

George King and Co., Ltd., Acquire Eustace Miles Business

The proprietary and manufacturing rights of Eustace Miles Food Co. (1921), Ltd., have been acquired by George King and Co., Ltd. The production in future will be carried on in their factory, the Albion Food Mills, Kingsbury, by the present Eustace Miles Staff, the whole coming under the analytical control of the chief chemist, Mr. W. G. Painton, B.Sc., A.I.C. The entire distribution of Em Foods has been entrusted to Mapleton's Nut Food Co., Ltd., of Garston, Liverpool, 19.

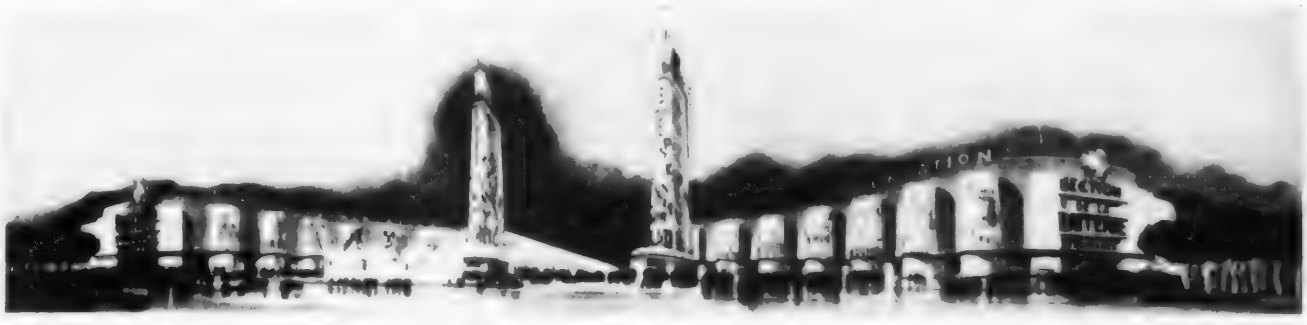
New Biscuit Factory

A new biscuit factory is being erected near Belfast for the production of biscuits made from English flour and other ingredients.

The cost of plant and buildings is given as nearly £80,000. Welfare facilities for employees in the form of rest rooms, baths, and canteens have been given special attention. Owners of the factory are Inglis and Co.

Lin-Can Factory Capacity

The Lin-Can factory at Boston, Lincolnshire, is to be doubled in capacity. Work is now in progress, machinery has been ordered and installation of it will be completed by the end of March next. The capacity of this factory will then be double what it is now, and although the extension will be largely employed on pea canning, it is also proposed to increase the canning of other vegetables as well.



An artist's impression of what the Food Section of the Paris Exhibition will look like.

Dairy and Ice-Cream Exhibition Postponed

The organising committee of the National Dairy and Ice-Cream Convention regret to announce that on the advice of the Standholders' Advisory Committee the arrangements to hold the Convention at the Alexandra Palace in North London, in consequence of the disastrous fire at the Crystal Palace, have had to be cancelled.

There will be no exhibition in the early part of next year, but the organising committee have reserved the whole of the Grand Hall and the Empire Hall at Olympia, London, for a far greater exhibition next November.

▼ ▼ ▼

Lazenby and Ridgwell, Ltd., announce that owing to increased business from October 12 last their address and that of the Lazenby and Ridgwell Canning Machinery Co., Ltd., will be Norfolk House, 7, Laurence Pountney Hill, Cannon Street, London, E.C. 4.

Industrial Films

As from November 30, 1936, all the industrial and educational film activities formerly carried on by the Western Electrical Co., Ltd., were taken over by Sound-Services, Ltd., Bush House, Aldwych, London, W.C. 2 (Telephone, Temple Bar 9621).

The entire personnel and equipment and all facilities of the Western Electric Industrial and Educational Department and of the Road Show Service have been transferred to Sound-Services, Ltd., of which Mr. E. P. L. Pelly is the Managing Director. Continuity of policies and the smooth carrying out of work in hand has been assured.

Forthcoming Lectures

January 19.—Symposium of papers and informal discussion on "The Testing and Servicing of Refrigerators". British Association of Refrigeration at 6.30 p.m. Institute of Marine Engineers, 85-88, Minories, London, E.C. 3.

February 16. — Symposium of papers and informal discussion on "Bacteria in Frozen Vegetables; Moulds in Timber". British Association of Refrigeration at 6.30 p.m. British Industries House Club, British Industries House, Marble Arch, London, W.

February 24.—Lecture, "Some Aspects of Modern Analytical Chemistry", by Dr. J. J. Fox, O.B.E., F.I.C., in the Chemical Lecture Theatre, University, Liverpool, at 6 p.m.

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Mr. R. M. L. Francis, managing director of National Adhesives, Ltd., of Slough, sailed for the United States on the *Queen Mary* on December 9.

New Electric Lamp

A lamp which is expected to be of particular aid to industry has just been perfected as the result of research undertaken by members of the Electric Lamp Manufacturers' Association. This is a development of the well-known mercury electric discharge lamp, at present used with such good effect for street lighting and, to some extent, in factories. The new models will be made in 80 and 125 watt sizes, whereas previously they were not marketed in smaller sizes than 150 watts. They look very much like an ordinary household lamp, but in place of the usual tungsten filament, the light is given out by an electric discharge in mercury vapour, the source being about half the size of a cigarette.

They are said to give at least three times more light at little extra cost, a remarkable feat when their size is considered, for it is such that the lamp can be inserted in most existing fittings. Another advantage they possess is that the colour rendering is improved on that of the discharge lamp at present used in lighting streets.

Arrangements to market the lamps in two or three months' time are being made by the companies connected with the E.L.M.A.

Peerless Mixer

A general service mixer of all-round merit is that supplied by the Peerless Electrical Manufacturing Co., Ltd. The bench-type model is complete with ¼ h.p. motor and has a bowl capacity of 12½ quarts. The machine is fitted with a 3-speed gearbox and finger-tip gear changing. To resist corrosive attack, the bowl, beater, and hook are supplied in Monel, added advantages of this metal being that it possesses high strength and is hard, durable, and easily cleaned.

Southern Railway's New Warehouse

One of the finest buildings of its kind in Great Britain is now available to traders and merchants, with the opening of the new Southern Railway Warehouse and Granary at Nine Elms on November 20.

The new building, which has cost £112,000, is constructed of reinforced concrete, with brick panelling, and is 310 ft. long and 80 ft. wide. The total storage area is 135,000 sq. ft. (over 3 acres), with accommodation for about 12,000 tons of merchandise.

The warehouse has seven floors, of which four will be used for the storage of grain and two for general traffic and one for machinery. Each floor will be served by three lifts, six sack elevators electrically worked, and sixteen spiral gravity chutes. A novel feature is the provision of a showroom for the display of goods.

TRADE LITERATURE RECEIVED

Chemical Plant

Manlove, Alliott and Co., Ltd., have issued a booklet illustrating a representative variety of machines and apparatus which they manufacture for the chemical trade. The machines illustrated include centrifugals of various types, rotary dryers (fire-heated and steam-heated), drying rolls, or film dryers of single roll or twin roll type, hydraulic presses, leaf filters, sterilising filters, filter-presses, and mixers and agitators.

The Parker Engine

Ashworth and Parker, Ltd., have published an attractive booklet dealing with the Parker Engine as well as with modifications such as pass-out or extraction steam engines, non-lubricated engines, and special engines. The booklet is well illustrated with photographs of Parker engines in various industries. In conclusion, a description of the new design extra high-speed steam engines and a list of users are given.

Rotary Louvre Dryer

Dunford and Elliott (Sheffield), Ltd., have published a leaflet on the Rotary Louvre Dryer. The machine consists of a horizontal drum with a series of internal channels near the circumference, into which hot air is admitted from a fan. These channels are covered by tangential plates which cause the hot air to pass into the inside of the chamber and through the material, at the same time preventing any material from falling backwards. The material travels from the feed hopper to the discharge end by the sloping of the inner lining of the drum, and as the drum rotates the charge mounts up one side with the uppermost particles rolling or tumbling over as they reach the angle of repose. The gases are admitted only to those channels immediately underneath the charge, and not to any others. To prevent overheating, less hot air is supplied along the drum as the material becomes drier.

International Combustion Ltd.

The company has issued a most attractive catalogue which gives a pictorial survey of their Derby works. The numerous illustrations include those of the Works, the Machine Shop, the Foundry, the Plate Shop, Pattern Shop, Erection, Test House and Laboratory (some of the illustrations showing the Hardinge Constant Weight Feeder, the Hum-mer Screen and Rovac Filters undergoing test) and the Stockyard.

Tyneside

A booklet on the Tyneside, issued by the Tyneside Industrial Development Board, gives details of the industries already existing in the Tyneside, of suitable available factory sites, and of the service to the sites, including labour supplies, water, power, and new materials. The salient features of the booklet are also printed in French and German.

The fine modern lines of the new Southern Railway warehouse and granary at Nine Elms are clearly shown in this photograph.

PLANT & MACHINERY NEWS

(Continued from last issue)

Industrial Floors

"Stelcon" Anchor Steel Plates and "Stelcon" Steel Clad Flags, made by Stelcon (Industrial Floors), Ltd., Cliffords Inn, London, E.C. 4, continue to be used by many branches of the food industry. These floors are dustless and are very easily kept clean, factors of great importance in the food industry. The dumping of goods and other heavy weights, and the small iron wheels common to most trucks have a devastating effect on poor floors. Stelcon floors are specially made to overcome these difficulties, and experience shows that they give great service by reducing maintenance costs to a minimum.

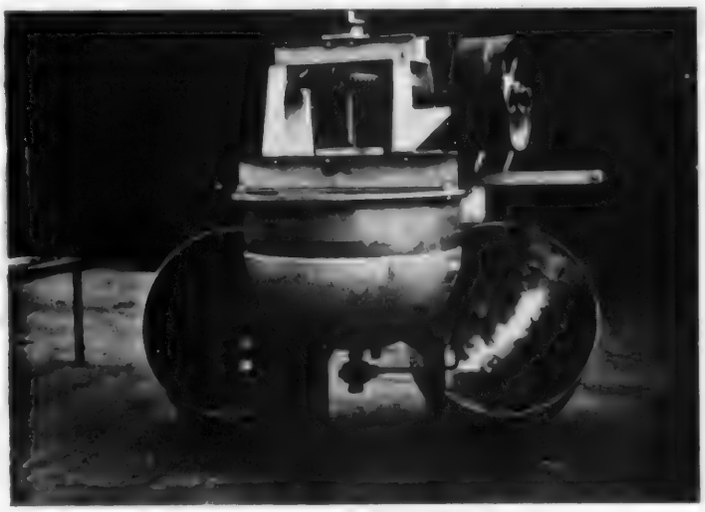
New Emulsifier

A new 100-gallon model of the Impulsor emulsifier is announced by the Improved Emulsification Co., Ltd., 28, Chiswell Street, London, E.C. 1. The machine is said to give improved efficiency as an emulsifier, and the risk of contamination of edible products has been reduced by the elimination of packing rings from the cylinder. A 5 h.p. motor is sufficient to operate the Impulsor at its maximum pressure of 3,500 lb. per square inch, and the simplified emulsifying head can be easily and quickly dismantled for cleaning and sterilisation.

A Stainless Steel Rotary Jam Cooler, with mechanical tipping gear, by the Aluminium Plant and Vessel Co., Ltd. In the background a battery of Stainless Steel Steam Pans.

Washing and De-Labelling Biscuit Tins

A new development of Robert Kellie and Son, Ltd., Dundee, is the Continuous Hydro Electric Machine for washing, de-labelling, and rinsing biscuit tins with patent rotary label extracting, filtering, separating, and ejecting mechanism. Provided with two standard washing periods of 5 minutes and 7½ minutes, the machine will handle all standard tins measuring approximately 9 in. cube with the usual removable lids as well as fancy tins of all sizes. The patented system of automatic extraction of labels and the simultaneous filtration of the recirculated solutions eliminates pulping, so that the machine functions for long periods without the necessity of cleaning the sparge pipes or renewing the detergent solution.



An adaptation by John Thompson (Dudley), Ltd., of their popular design of streamlined jacketed pan. This particular installation shows vertical type mixer with paddle agitator, suitable for mixing viscous fluids, pastes, creams and milks, and also for blending syrups, essences, juices, etc. Behind the mixer are two streamlined pans made of nickel, shown in the course of construction.

Leonard Mixing Valves

Walker, Crosweller and Co., Ltd., have put on the market very recently the Leonard Mixing Valve, which will give a supply of blended hot water, using either hot and cold water or steam and cold water as sources of supply.

Leonard valves will work satisfactorily irrespective of differences in pressure in the hot and cold water supplies, irrespective also of variations in pressure and variations in temperature of the supplies. Also, in the event of failure of either the hot or cold supplies, the valves shut off entirely, being, therefore, anti-scalding and anti-chilling.

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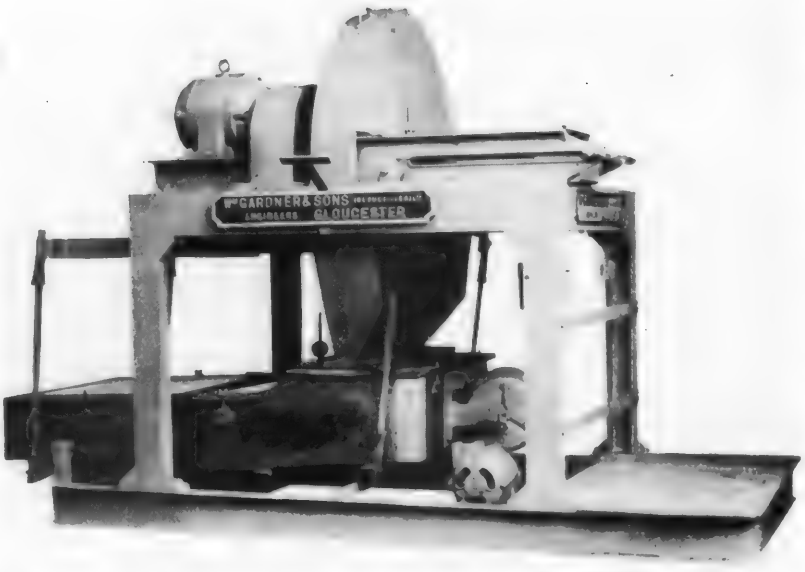
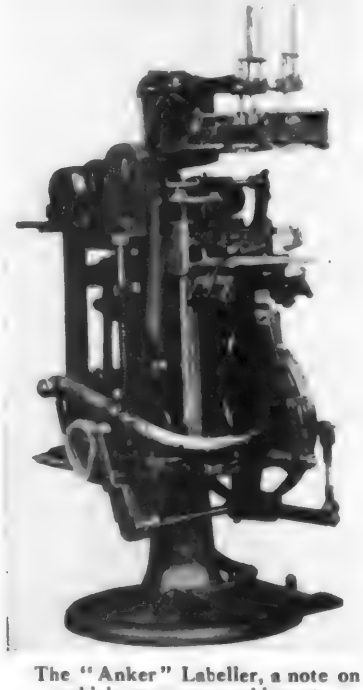
Babcock and Wilcox, Ltd., Babcock House, Farringdon Street, London, E.C. 4, have recently made installations for H. J. Heinz Co., Ltd., and also for the United Dairies. In the former case they installed four boilers.



A Shredding and Granulating Machine, with sieve separator which is fitted with vibrationless drive, by Wm. Gardner and Sons (Gloucester), Ltd. The whole is mounted in a metal frame and the machine can be directly coupled to an electric motor.

Carton Printing

During the past year Dalziel Foundry, Ltd., 19-31, Earl Street, Finsbury, London, E.C. 2, have installed machinery and apparatus of entirely new design for the production of PMP printing sleeves to fit small multi-colour carton printing and cutting and creasing machines. The advantages of these printing sleeves are: certain classes of half-tone work can be included in the design on the carton, and the process is entirely mechanical.



The "Anker" Labeller, a note on which appears on this page.

"Anker" Labelling Machines

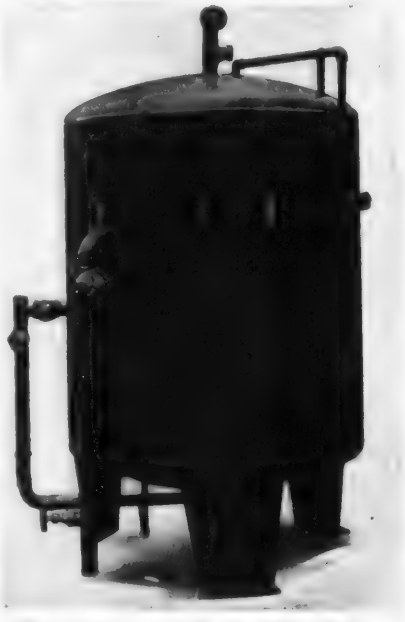
A complete range of "Anker" labelling machines for the various requirements of food factories is constructed in the British works of Anker Brothers and Co., Ltd., 30-34, New Bridge Street, London, E.C. 4. These models are each specially constructed to suit the varying requirements of the containers and labels, either in shape or size or according to texture of paper. The adjustable parts are so produced as to simplify and speed up change over by the operator.

The "Anker" type labeller illustrated on this page represents a special construction with spring wiping device, and the "Anker" neck ring installation which gives a perfectly straight overlap of ring labels on cylindrical and conical bottle necks. The machine takes about 1 sq. yd. space, is run by a ½ h.p. motor, and has an average speed of 40 labellings per minute. Interesting features on these labellers for particular requirements are a vertical pressing device, pressing labels tightly on flat and uneven surfaces, also a novel centre gumming device, ensuring as equal a quantity of gum in the centre of the labels as on the sides, and working with utmost cleanliness. Other examples of the many made by this company are the "Anker-Colibri" labeller for labelling paste pots and small cartons and the "Anker-Rapid" can labeller for labelling cans.

Brine Filter

Scheibye and Henius Brine Filter has been recently introduced into this country by Henius, Ltd., 154-156, Blackfriars Road, London, S.E. 1. It has already proved a success in Denmark, and one has been tested in Ireland for a year. It is the outcome of extensive research into the question of bacteria in pickling brine, and the process enables the brine to be effectively filtered.

The filter material consists of specially treated stones and sand, which are placed in a container. The brine is forced through the filter by means of the brine circulation pump, both before entering and after leaving the pickling tanks. The filter is cleaned by passing water through it. The process is very simple, there being no mechanical parts. The brine is kept clean, fresh, and of good colour, while the taste of the bacon and its keeping qualities are improved.



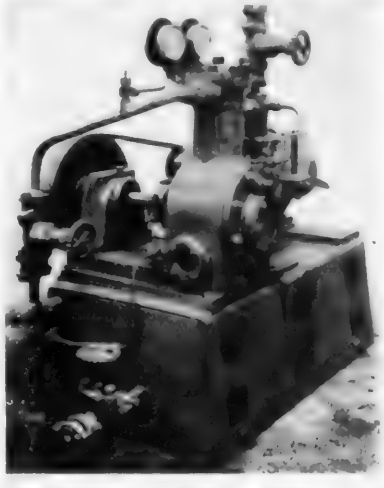
The Scheibye and Henius Brine Filter.

The Mono Pump

The "Mono" pump made by Mono Pumps, Ltd., Greenford, Middlesex, has many applications in the food industry, and has been used for handling jam, chocolate, wines and spirits, etc. The pump consists of a rotor and a stator. The rotor is in the form of a series of circles arranged eccentrically to form a single start scroll; this rotates in a multiple start thread which forms the stator, with the result that the stator becomes a cylinder of infinite length along which, in effect, a piston travels to infinity. It is stated that the design of the pump permits it to deal successfully with difficult pumping applications.

Pressure Cooker

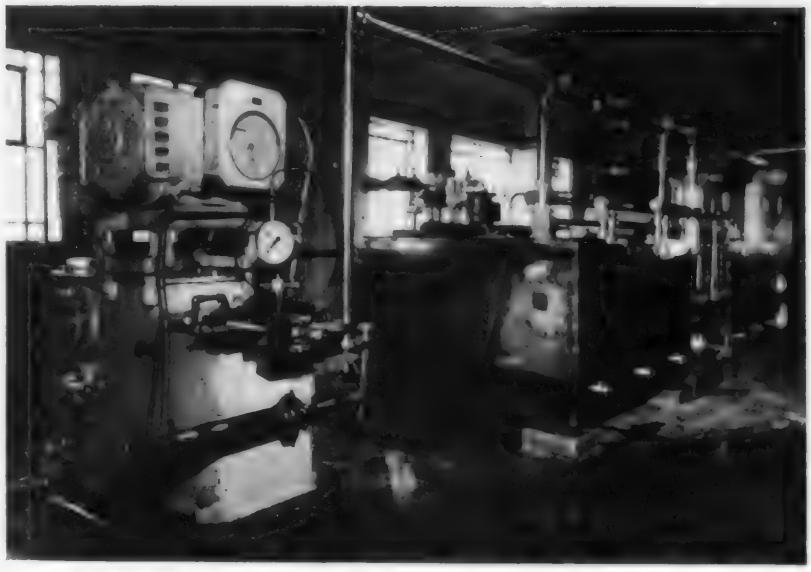
The principal developments of Food Machinery (M. and P.), Ltd., Park Works, Manchester, during the past year have centred around the Pressure Cooker. It is designed to assist the canner who wishes to handle food products at high temperatures. It enables the processing to be done with the utmost precision and that the product shall not be subject to too much agitation. The full range of cans now popular with the general public can be processed, and the adjustments necessary to handle the various sizes are effected in a few minutes. The company have installed several of these cookers during the year and have a number now on order for British and Continental canneries, including two of the largest for Batchelor's Peas, Ltd.'s new cannery now in course of construction.



Single-cylinder "Polar" Sleeve Valve Ammonia Compressor arranged for "V" belt drive, mounted on compressor box bed housing condenser and liquid receiver, as supplied recently to the London Co-operative Society by H. J. West and Co., Ltd.

Electro-Magnetic Drums

Food manufacturers who are faced with a problem of extracting iron from their commodity will be interested in the machines made by the Rapid Magnetting Machine Co., Ltd., Magnet Works, Lombard Street, Birmingham. The "Rapid-Biaflux" patent Electro-Magnetic Drums will extract iron and automatically discharge it at a given point. These drums are used for the treatment of sugar, and the two supplied to Tate and Lyle, Ltd., were at one time the largest in the world. The company is at present building a still larger one, however. Electro-magnetic separators of many types are made by this concern, who are also prepared to design magnets specially to suit a given process.



A 750 G.P.H. Homogeniser made by the Brush Electrical Engineering Co., Ltd., and installed at the Midland Counties Dairies, Ltd., Birmingham, for ice-cream continuous process plant.

Vacuum Soldering Plant

Canning perishable products in vacuum has received considerable attention in recent years, and Wm. Douglas and Sons, Ltd., Putney, London, have invented a vacuum apparatus for this purpose. The apparatus consists of a circular annular chamber, in the interior of which is a revolving floor which is operated by a hand-wheel from the outside of the chamber. For loading up, there is a side door through which the tins are put, and when the revolving floor is covered, this door is closed and the air is exhausted by means of an air pump. Before putting the tins into the apparatus, a small aperture is made in the side or top of the tins, and alongside of these there is placed a blob of solder. When the vacuum is produced there will be no air present and no oxygen upon which the spores of organisms can subsist. The aperture is closed by means of an electric soldering-iron with a universal joint, which can be moved over the rows of tins as they pass under this soldering-iron on the revolving table. The little blob of solder melts and closes the opening. The apparatus can then be unloaded at once and refilled again immediately.

A combined Processing and Raisin Seeding Outfit having a capacity of 15 cwts. to one ton per hour by the Whitmee Engineering Co., Ltd. The object of the steam heated processing cylinder is to restore hard, old or sugary fruit to a fleshy condition suitable for seeding. The fruit can be either heated only, or passed through a steam spray in addition. The outfit includes electro-magnets for extracting nails.

Three head vacuum operated filling machine for salad cream, sauces, olive oil, etc., by Albro Fillers and Engineering Co., Ltd. It has an output up to 200 dozen bottles per hour and is constructed throughout in solid block tin with stainless steel tanks. Can also be supplied in block ebonite or stainless steel.

Electroflo Meters

The Electroflo Milk Tank Volume Indicator made by Electroflo Meters Co., Ltd., Abbey Road, Park Royal, London, N.W. 10, is an adaptation of a self-contained pneumatic device which has been employed successfully for a number of years in connection with the measurement of liquid levels. It has now been modified and all parts coming into contact with milk or other fluid foods can be efficiently sterilised. There is an 8-inch dial with two scales, one giving depth and the other volume in terms of gallons. Another development is a recording thermometer designed to obtain accurate results in large cold storage chambers, etc. It is provided with a special thermometric system 100 ft. long, the entire portion of which is sensitive to temperature change and which enables an average temperature to be obtained. A third new development is an indicating controller which covers a wider range of operating conditions than previous types. Several features are the subject of patents which are pending, so further details are not yet available.

Vacuum Return Pump

The latest arrangement of the Vacuum Return Pump for steam heating or equivalent systems made by Drysdale and Co., Ltd., Yoker, Glasgow, is known as the "Vampire." This pump handles both vapour and water, a separate rotor being used for each, and generally operates at about 10 to 12 inch vacuum. On starting up any given heating or steam system this pump will free the pipes of air and water, thus permitting a higher temperature to be reached within a shorter time. The fact that the system is under vacuum also permits a lower working pressure with a corresponding drop in fuel consumption. The discharge is fitted with a special equilibrium valve, which prevents the escape of steam to the atmosphere. The vertical construction of the pump has several advantages over the horizontal design, such as minimum space occupied, vertically divided casing giving maximum accessibility, driving motor well above floor level, etc.

Laycock Engineering Co.

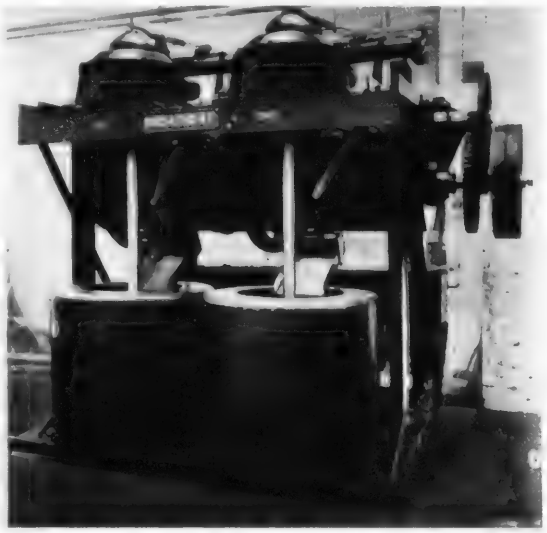
The Washing Plants made by the Laycock Engineering Co., Ltd., Millhouses, Sheffield, are of particular interest to food manufacturers in that they give an easy, speedy cleansing to all utensils and food machines — in dairies, bakeries, breweries, and food manufactures. Among the other products made by this company are Laminated Gears, which are useful in factory gear drives where a durable silent drive without vibration is essential, and Air Compressors for use where compressed air processes are necessary. All compressors are single-stage and build up to 150 lb. per square inch, which can be reduced again to the pressure required for each specialised process.

Power and Process Steam

Food manufacturers often have an opportunity to provide power at low cost which is not available to those who do not use steam in their processes. The system worked out by Bellis and Morcom, Ltd., Ledsam Street Works, Birmingham 16, is the combination of power and process steam services whereby process steam is used, first to provide power and thus do double duty. During the past year engines have been supplied to milk product and gelatine factories, but the system is suitable for adoption in any factory requiring steam for heat or process in fair quantity. When there is not sufficient process demand to supply the whole of the power required, it is sometimes economical to drive a refrigerator, compressor, or vacuum pump by a steam engine, the exhaust from which is used for process work.

Hunter Emulsor

The Hunter Emulsor is a compact, self-contained unit in which the makers, the Hunter Machines Co., Ltd., Nitshill, Glasgow, have succeeded in incorporating the three distinct processes of mixing, emulsifying and homogenising, which are controlled by a single valve. When the valve is turned to "Vortex" a circular motion is imparted to the contents of the container, and oil or finely divided powder tending to remain on the surface are drawn down into the emulsifying unit. Complete and uniform mixing of all the contents is assured by turning the valve to the "Agitate" position, and the process is then carried further by gradually subjecting the whole contents to Homogenising pressure. In most cases the necessity for premixing the materials is obviated, the various components being added direct to the container, and the whole subjected to such degree of treatment as may be required. The emulsors are constructed with capacities ranging from 2 to 500 gallons.



A battery of 30" × 18" Water-Driven Centrifugals with Mixer and Accessories by Thomas Broadbent and Sons, Ltd. Centrifugals are now being extensively used in the manufacture of milk sugar, milk powder, coffee essences, jams, fruit pulp, potato crisps, sausages, etc.

OUTSTANDING PAINTING PROCESS for FOOD FACTORIES

We have had brought to our notice a process of painting which should be of considerable interest to all owners of food factories and similar premises, where quick application of the necessary coats can make possible the cutting down to an absolute minimum of the inconvenience and disruption caused by ordinary painting methods.

The paints in question are made under a patented process, and have the following unique features: Any number of coats necessary for painting or repainting can be applied with only half to one hour between coats, by spray, all these coats drying together overnight. This feature makes possible the complete painting or repainting of any job, or part of a job, during the night or the week-end, with a finish which is hygienic, can be washed indefinitely, and which leaves a surface which is ideal from a cleanliness point of view. It cannot be stressed too strongly that these paints are completely non-poisonous, and conform with the Home Office Regulations in every way for spraying paints for inside use. They are highly resistant to acids and alkalis, such as are met in manufactures, and can even be washed down with soda-water up to a 10 per cent. solution.

When it is borne in mind that walls, ceilings, etc., in food factories, if painted with paints of this description, can remain for 7 years before it is necessary to repaint, it will be readily seen that, whilst the initial cost of painting may be slightly more than distempering, it is infinitely more economical in the long run—and a very much more hygienic and suitable surface is given to the walls, ceilings, and other surfaces which are also painted.

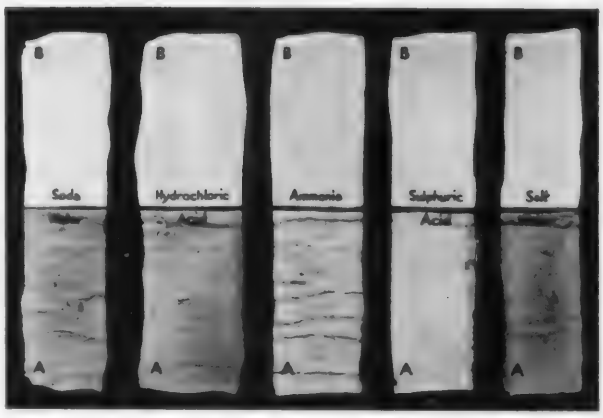
We understand that the cost of these materials is not greater than that of ordinary paints, but their outstanding features, both from a quick application point of view and their resistance to the destructive action of acids, alkalis, etc., make this proposition well worth the consideration of all those who have such premises to paint or repaint at any time.

We have been informed that these materials are suitable for painting any surface, including bare bricks, woodwork, iron and steelwork and plasters of all kinds. Furthermore, when it is considered that washing can be carried out with cheap, simple, but efficient cleansing fluids, like soda-water, without detriment to the paint, a perfectly clean wall surface can always be assured.

We also understand that these paints are used for factory painting and maintenance by chocolate manufacturers, biscuit manufacturers, jam manufacturers, fruit preservers, tobacco manufacturers, milk preservers, beef extract manufacturers, etc., and that they have been recognised by them as more suitable than anything else for factory painting.

Vigorised Paints, the name given to these products, have also been adapted to a process for painting vehicles, which permits of as many as 5 or 6 coats being applied by spray in a working day. This cuts down that long out-of-service period of vehicles in the paint shop, and permits a repaint to be completely carried out in a working day.

This type of paint is made and supplied by Robert Ingham Clark and Co. and R. Gay and Co. (under licence from Pinchin, Johnson and Co., Ltd.), 4, Carlton Gardens, London, S.W. 1.



A photograph of a test plate one half of which, namely "B", has been coated with Vigorised White Paint, the other half, "A", with best Linseed Oil White Lead Paint. The plate has been divided into five sections with plasticine and 10 per cent. solutions of soda water, hydrochloric acid, ammonia, sulphuric acid, and salt water allowed to stand on the surfaces for six hours. The test is to discover the comparative resistance of Vigorised Paints and ordinary White Lead Linseed Oil Paints to certain acids and alkalis frequently met in commercial and ordinary factory painting. The Linseed Oil White Lead Paint has broken down and become seriously affected in every case, whereas the Vigorised Paint is unaffected and even the gloss is unimpaired.

CANADIAN FISHERIES STATION PROGRESS REPORT

Progress Report number 29, issued by the Pacific Biological Station and the Pacific Fisheries Experimental Station, British Columbia, deals with work done on the following subjects: Refrigerator Car Tests, the Sea Lamprey and the Hagfish, Artificial Stimulation of Spawning in the Pacific Oyster, and Colour in Canned Salmon.

TWO BULLETINS of STANDARDISATION from POLAND

We have received two bulletins from Dr. D. J. Tilgner, of the Food Products Laboratories of the Standardisation Bureau of the Association of the Polish Chambers of Commerce and Industry, dealing with the "Normalisation of tinplate containers", and "Shrinkage norms for smoked sprats". The first of these contains a number of illustrations showing standardised methods of measuring can sizes in Poland, and which were published in the November canning number of Food Manufacture.

The RAT PROBLEM and the Food Manufacturer

Elliot B. Dewberry, M.R.I.P.H., M.R.San.I.

The problem of rat extermination is a difficult one, chiefly because the rodents are prolific breeders and have migratory habits. It is essential from an economical as well as from a sanitary point of view that war should be continually waged throughout the country on rats, in order to reduce the enormous amount of damage to foodstuffs in factories, mills, warehouses and stores, and the destruction to property and materials which is caused annually by their ravages.

IT HAS been estimated that on an average one rat causes, by the destruction of food and materials, damage to the extent of a farthing a day, roughly 7s. 6d. a year, amounting to a total loss of £15,000,000 per annum in Great Britain and Ireland, but this large sum of money does not include the value of the food spoiled or the damage done by this pest on board ship, or on the docks and quays, where such commodities as wheat, barley, maize, rye, meal and cakes, vegetables, and fruit are temporarily stored. Unless there is a shortage of food a rat eats only of the best. A full-grown rat will devour 2 oz. of grain daily—i.e., 40 to 50 lb. per year. The latest available figures estimate the rat population of this country is from 40 to 50 millions, and the cost they entail is given as £70,000,000 per annum.

Chief Characteristics of Black and Brown Rat

The two species met with in Great Britain are the black rat (*Rattus rattus*), commonly called the ship, Indian, or Old English rat, and the brown rat (*Rattus norvegicus*), known as the common brown or Hanoverian rat, water rat, barn rat, sewer or grey rat. These names, however, often create a wrong impression, and must not be taken to indicate the colouring, but the species may be easily differentiated by their appearance and habits.

The black rat is of slim build with a sharp muzzle. The ears are large, thin, and reaching or covering the eyes when pressed forward. The slender tail if turned back over the head reaches beyond the head. The pads on the soles of the feet are relatively large. Weight about 8 oz.

The brown rat is the larger of the two species, of heavier build with a blunt muzzle. The ears are small, thick, and hairy, and hardly reach the eyes when pressed forward. The stout tail when turned back over the head reaches to about the eyes. The pads on the soles of the feet are relatively small. Weight 14 to 17 oz. A brown rat of 30 oz. is, however, not uncommon, and one 2 lb. 12 oz. has been recorded.

[*National Museum of Wales.*

Rats destroying grain.

Each species has its different aptitudes, capacities, and preferences, and each insinuates itself into the most suitable environment.

Observations and records in the City of London suggest that the brown rat is now outnumbered by the black rat by about 3 to 1.

Damage Attributed to Rats

Rats will gnaw through almost any obstruction, and even through such materials as leather, lead pipes, ivory, and concrete, and by this means their ever-growing incisor teeth are kept down to a reasonable length. During their forages they will carry away valuable articles for use in the construction of their nests. They destroy large numbers of eggs. They gnaw at the cases, and those eggs near the top become broken and stain the remainder. Frequently carry them away unbroken, displaying great ingenuity in getting them over obstacles such as up or down stairs.

It must also be remembered that destruction to property caused by these rodents burrowing under foundations, gnawing their way through floors, partitions, gas and water pipes, means considerable expense on repairs to firms and public bodies. Rats have been indirectly the cause of fires by gnawing away the insulating covering on wires used for electric lighting. Rats require both food and shelter for their well-being, and they cannot persist where either of these is lacking. The infestation of premises by these vermin is usually traced to some condition favourable to the animal and the removal of this condition discourages their presence and means permanent reduction of rat damage.

[*U.S. Bureau of Biological Survey.*

Showing how rats gnaw through lead piping and the insulation of electric wiring, causing untold damage.

Migration

Their migratory habits are well known. In the spring they depart into the open fields, where they burrow and pass the summer. In the early winter they re-establish themselves in buildings, lay up in their holes during the day and go forth in search of food and water as soon as it gets dusk. They travel long distances to and fro between their nests and a desirable source of food and water, and the routes taken eventually become well-beaten tracks, which are easily recognisable. They particularly favour tunnels or narrow runways, providing they are open at both ends—this apparently gives them a sense of security.

Preventive Measures

Rat Proofing.—Food manufacturers, owners of warehouses and other premises in which produce and supplies are subject to damage by these vermin, have found that the cost of "rat proofing" their buildings is, in the long run, the cheapest form of "rat insurance", and it is without doubt the greatest factor in prevention, but requires care, perseverance, and work. In carrying out the rat-proofing of premises built of brick and stone, careful and thorough search should be made for small openings where rats might enter, such as around pipes and cracks, damaged ventilating grids to floors. Such defects must be made good either with cement concrete or metal sheeting. Without doubt the most common rat harbours are dead spaces within double walls and beneath floors. All basement lights and skylights should be protected with stout wire netting of small mesh. Drain ventilators and other openings should have gratings to protect them. The disconnecting trap should be examined to ascertain whether the stopper is in the cleaning arm. Doors in basements, which are likely to be left open at night, should be fitted with self-closing devices, and, if necessary, protected at the bottoms with metal sheeting, and all basement windows screened with stout wire gauze.

Other Measures

Refuse and garbage should either be burned, buried or stored in metal bins with close-fitting covers and emptied regularly.

All water tanks and storage cisterns should have rat-proof covers. Rats must drink frequently, the brown rat at least twice in twenty-four hours; the black rat, however, can go longer without liquid. The rodents also have a habit of making their nests beneath or conveniently near cisterns in roofs. In warehouses, especially in those where dried food is stored, the water supply should be cut off; this often causes the rats to leave the premises.

Methods of Destruction

The principal methods of dealing with these pests are: Poisoning, fumigation, trapping and snaring, hunting with dogs and ferrets. The protection of the rat's natural enemies, such as owls, weasels, buzzards, kestrels, stoats, etc. The first three only will be described.

Poisons.—There are many preparations on the market containing phosphorus, arsenic, or strychnine, etc., for the destruction of rats, but in using these there is always a risk of poisoning other animals.

Barium Carbonate.—This is a very useful and effective mineral rat poison, being tasteless, odourless, and cheap, and is readily taken with any food with which it is mixed. There is, however, some slight risk as to its use, and care must be taken to prevent the access of domestic animals to the baits. It is estimated that one and a half to two grains in a bait is sufficient to kill an average sized rat.

The following recipes are recommended:

Barium carbonate powder ..	1 part
Fine oatmeal	2 parts
Castor sugar	1 part

Rub all the ingredients through a fine sieve and mix well.

Barium carbonate powder ..	1 part
Cheese grated (or minced kipper) ..	1 ,,
Dripping	1 ,,
Fine oatmeal	1 ,,

Melt the fat and mix it thoroughly with the dry ingredients to form a thick paste.

Barium carbonate powder ..	1 part
Rolled oats	2 parts
Dripping	1 part

Prepare as for No. 2. In summer use rather less fat.

Red Squill (*Sea Onion*).—This bait, which is probably the safest to use, gives excellent results if a temporary removal of all sources of drink is possible. It is made up in a convenient form as small biscuits, which are comparatively harmless to domestic animals but poison rats and mice. These may be purchased at any drug stores. A liquid preparation is also obtainable. This is mixed with an equal quantity of fresh milk, which has been scalded and allowed to cool. Oatmeal may be added to make a

thin porridge. Some of the bait is put in a saucer or similar receptacle and placed near the rat holes and runs at night. The users of squill (*Urginea maritma*) should, however, satisfy themselves that they obtain the genuine article, as owing to the peculiar properties of this poison the baits soon lose their toxicity unless they have been carefully prepared and packed. A list of firms whose preparations conform to all reasonable requirements can be obtained from the Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W. 1.

The following squill preparations are recommended:

Red squill powder	1	part by weight
Fine oatmeal (or rolled oats)	2½	parts ,,
Dripping	1½	,, ,,

Melt the fat and mix it thoroughly with the dry ingredients to form a thick paste.

Red squill powder	1	part by weight
Fine oatmeal	2	parts ,,
Castor sugar	2	,, ,,

Rub all the ingredients through a fine sieve and mix thoroughly.

Rat Viruses

The use of virus preparations (which consist of cultures of microbes) for the destruction of rats is undesirable in all situations where foodstuffs are prepared, manufactured, or stored.

Warning

When poison of any description is used in buildings for the extermination of rats it must not be prepared and handled indiscriminately and the persons entrusted with the work should be instructed in the following points:

1. To use the greatest care in mixing and handling the baits.

2. Only the minimum amount of poisonous material should be used.

3. To give full warning to all concerned that poisonous baits are being laid down. The situations where baits are laid should be carefully recorded and visited regularly.

4. To prevent domestic animals from gaining access to the baits or to the bodies of poisoned rats. If used outdoors the baits should be placed well within the burrows.

5. Strong poisons such as phosphorus, arsenic, etc., should not be used near pigsties, kennels, poultry-houses, or in granaries or other food stores.

6. To see that all unconsumed baits are collected, and that dead rats are buried or burned.

Law with Regard to the Laying of Poisonous Baits

(*a*) The poisoned grain prohibition and poisoned flesh prohibition Acts of 1863-4 forbid the placing of poisoned grain, seed, meal, flesh, or other poisoned matters in any exposed place, field, or plantation.

(*b*) The Protection of Animals Act, 1911, which restricts the use of poisoned matter, provides that it shall be a defence that the poison was placed by the accused for the purpose of destroying rats, and that he took all reasonable precautions to prevent access thereto of dogs, fowls, or other domestic animals.

[*U.S. Bureau of Biological Survey.*

Rats in a corn crib.

Trapping.—The large break-back, with a wooden platform, is a cheap and efficient trap, but to secure success the bait should be fresh and frequently changed. Baits used for rats should always be of a different nature from the food they usually obtain. Bread is the best bait; oatmeal, cheese, tallow, fish, lard or dripping are also attractive to the rat. The "steel-gin" can be set unbaited in rat runs, earth, chaff, or sawdust, being lightly sifted over the trap to hide it from view, and at the same time the surroundings should be made to look as natural as possible.

In Liverpool the large 19-in. French cage trap is chiefly used, and has given the best results; they should be baited, covered with a bag or other covering and left open for a few nights to let the rats have a free run to get them accustomed to the traps; later, the doors are closed and the traps set in the usual way, with the result that the traps are usually found full.

The "rat-lime" or "varnish" trap (a mixture of resin and linseed oil or crude castor oil) is now extensively used with excellent results. This is made by spreading strong lithographic varnish or rat lime, previously heated by standing the container in boiling water, one-sixteenth to one-eighth of an inch on cardboard or thick paper measuring about 15 in. × 12 in., a suitable bait being placed in the centre. The trap is then placed along the rat run or in the vicinity of the rat hole, which can easily be detected by sprinkling fine flour on the floor at night. The trap remains effective for three or four nights. This varnish trap is useless in wet places or where there is much fine dust.

With regard to the efficiency of the various kinds of traps for catching rats, the Medical Officer of Health for the City of London in a recent report remarks on the merits of those which have been tried out in the City of London: "Various kinds of traps have been used, the ordinary cage trap, the eel pot, the round wire, and

other types of wire traps. None of them are very successful, and some are constructed of wire so fine that captured rats are able to force the wires apart and escape. The traps which are found to give the best results are the 'break-back' and the 'varnish' trap, the latter being now in general use and the most successful of all."

Fumigation (Gassing).—Poisonous gases, such as sulphur dioxide, chlorine, carbon bisulphide, cyanogen, etc., are frequently used to destroy rats in warehouses, stores, holds of ships, refuse tips, etc. For warehouses and stores sulphur dioxide gas is the best agent to use, but only experienced persons should be employed. Gassing machines can be hired for the purpose.

After the rats have been driven out of buildings or destroyed, all holes should be blocked up with a mixture of cement and glass, or glass and tar. The following substances can be introduced into burrows and runs to induce rats to exchange secure quarters for those in which they can be more readily attacked: Gas tar, chloride of lime, caustic potash, strong solutions of ferrous sulphate, spent calcium carbide.

Anti-Rat Legislation

In 1919 was passed the Rats and Mice (Destruction) Act. It is a statutory obligation, under Section 1 of the Act, upon all occupiers of land or buildings to adopt such measures as may be necessary and reasonably practicable both for the prevention of infestation of rats and mice and for the destruction of these rodents when present. Neglect of such measures is punishable, on conviction, with a fine not exceeding £5, or £20 if the person concerned has previously been served with a notice under the Act, requiring him to take these measures. Where land is not occupied by any tenant or other person, the expression "occupier" means the owner of the land and the expression "land" includes any buildings and any other erection on land and any cellar, sewer, drain, or culvert in or under land. It is therefore important from the legal as well as the economic standpoint to adopt where necessary all possible methods of rat prevention and destruction.

Agricultural stations will give practical advice on this subject, and local authorities are always willing to assist.

NEW FACTORY of BRISTOL'S INSTRUMENT Co., Ltd.

A RECEPTION was held by the Bristol's Instrument Co., Ltd., on December 10, in order to view their new factory at Brent Crescent, North Circular Road, West Twyford. The party was conducted round the factory by Mr. G. H. Gaites, Managing Director, Mr. J. F. Wright, Works Manager, and Mr. C. Dupen, Sales Manager, and a most interesting visit it proved to be.

The factory itself is modern, up-to-date and well-lit, providing excellent working conditions. A feature of the lay-out was the clean and dust-free state of the works, largely due to the absence of overhead pulley and belt system and to the wooden floor. The assembly benches are laid in line giving each man the maximum working space and the bench-line is provided with gas, compressed air and electric power. Here Bristol's recording and controlling thermometers, indicating and recording pressure controllers, liquid level gauges, humidity instruments, time cycle controllers, and other allied instruments are manufactured from drawings of the Bristol Co., U.S.A., and backed by the wide experience of the American company. The instruments are made wholly by British labour and almost entirely of British materials. One of the outstanding points in the tour of the works was the scrupulous cleaning and dehydrating processes which the bulb and capillary tubing of the thermometers undergo before being filled with the expanding medium (either inert gas or organic liquid). Other prominent items were the critical testing carried out, the method of mounting the finished instrument on a separate base in the casing, so that there is no possibility of strain or warping on opening and closing the casing, the robust design of the clock in the recorders, and the fixed printing machine (no rollers) for printing the recorder charts on special paper. The printed charts are said to be correctly lined to 1/1000 of an inch by this method. The instruments are produced in small, economical batches with an accordingly quick sale—they are practically tailor-made in the truest sense of the word.

A view of the interior of the new factory of Bristol's Instrument Co., Ltd. The assembly benches can be seen near the windows on the right.

INFORMATION and ADVICE

Sausage Canning—Kippering of Herring—Curing and Smoking of Salmon—Turtle Soup

Sausage Canning

2,067. *Can you please let us have information on the canning of sausages in lard, with skins removed?* (London.)

There are, of course, many methods of canning sausages, each canner having his own particular method.

As a basis for trial you might try soaking the sausages in cold water for about an hour so as to swell them; bring to the boil and leave for 2 to 3 hours in the slow boiling water. Skin carefully and place in cans and cover with melted lard. Seal and process.

The processing temperature should not exceed about 228° F. The time of processing depends upon the size of the pack, but should not be longer than necessary for the centre to assume the afore-mentioned temperature.

Kippering of Herring

2,068. *Could you please give me some information regarding the modern methods for the kippering of herring?* (Glasgow.)

The following are brief notes on modern methods:

Splitting and Gutting

The herrings, which should be as fresh as possible, are split from head to tail along the back, the gills and viscera removed and placed in a barrel set aside for the purpose. Care should be taken that the sound (silvery swim-bladder) is removed with the rest of the offal. It is necessary that the gutting process be carefully and thoroughly carried out, as if any of the contents of the stomach (and the fat adhering to the long gut) are left in, they may cause the fish to deteriorate.

The gutted fish are now thoroughly washed. This is usually done by keeping a wide shallow basket floating in the wash-tub under running water supplied from a short hose. Into this basket the herrings are emptied. The basket is twisted rapidly to right and to left to ensure thorough washing. The fish are then removed, drained, and emptied into carrying baskets (quarter-cran size), ready for pickling.

Pickling

This process is carried out in vats or tanks, a convenient size being 6 ft. by 3 ft. wide by 3 ft. deep, and three or four of these may be required.

The pickle is made by dissolving common salt (sodium chloride) in clean water until it is strong enough to float a herring.

A special form of salinometer registering up to 40 per cent. may also be used. The solution should never be below 20 per cent. The salinometer usually shows a buoyancy of 20 per cent. when put into the natural pickle which herrings produce in the process of curing.

The time allowed for the pickling depends to some extent upon the state of the weather and the season of the year. Soft herrings require a longer time to pickle than firm fish, and certain markets require more salt than others. Half an hour may be taken as a fair average for the process.

Sometimes a synthetic dye or annatto is used to give a golden colour to the fish; this, however, is not necessary if smoking is properly carried out, and was only introduced to quicken the process.

When sufficient herrings have been emptied from the carrying baskets into the pickling vat, the fish on the top should be spread out, back up, and freely sprinkled with salt. This not only assists in curing the herrings on the top, but helps to keep up the strength of the solution. Pickle for kippers may be used repeatedly, but not so often in the summer as in the winter. In the case of the former, the fatty nature of summer herrings is liable to turn the pickle sour or stale. The strength of the pickle should be tested regularly and more salt added as required.

Smoking

The fish, on being taken out of the pickle, are next hung up on hooks (kipper speets) attached to wooden bars (tenters), and placed in the smoke kiln one above the other.

There has been no change in the traditional type of smoke house which is used for actual kippering, and success of smoking is greatly affected by the varying humidity of the atmosphere and the experience and skill of the individual in charge of the process.

When the kiln is full smoking is commenced, the smoke being made generally of a mixture of oak chips and whitewood sawdust, or whitewood alone. Great care is necessary in the smoking process that the fish is not cooked. The average result of smoking is to add to the fish a smoky flavour (not nearly so much as in the past) and the required deep golden colour. The kipper has a flavour and texture that very quickly betrays imperfect cure of the fish.

Smoking usually takes from eight to ten hours, and a certain temperature has to be maintained or the kippers will not acquire a good colour; on the other hand, if the heat is too great the fish will probably fall off the hooks and be spoilt. The idea during smoking is to remove some of the moisture from the fish to the extent of about 10 per cent. of its split weights (considerably less than in the past, when a loss of 20 per cent. was common). A capable man in charge of the process should be able to take his kippers out from the smoke house all about one colour.

When the fish have attained the required colour they are taken out of the kiln and placed on racks to cool

thoroughly. Each rack is usually about 7 ft. long by 5½ ft. high, with five rails 8 in. apart; upon these the tenters with the newly smoked kippers are placed. Carelessness in handling often results in the kippers being bad after they have been packed in boxes.

In the process of packing all broken and defective fish are put on one side and packed as a second grade article. The number of kippers in a box depends on the size of the fish, but as a general rule they contain 20 pairs of large-sized, 30 pairs of medium, and 40 to 50 pairs of small kippers.

Curing and Smoking of Salmon

2,069. *We would be glad to receive information on the curing and smoking of fresh caught rod and line autumn salmon—cold room curing and smoke stove facilities are available.* (Newport.)

Scotch Method

Wash and head the fish and split it down the back, removing the roe and intestines; then wash again to free it from blood stains, etc. Mix equal quantities of strong fishery salt and brown sugar. Lay the fish in plenty of this mixture and allow it to lie in it for forty-eight hours. The fish might be well rubbed with the preservative before being salted down in it. After forty-eight hours hang the fish up, either in the open air and sun or in an ordinary kipper or finnan kiln. Three small double-pointed sticks should be fixed through the skin at intervals along the back of the fish to keep it spread out during the process of drying. If dried in a kiln a few hours' smoking is recommended. Some curers add a little saltpetre to the salt and sugar.

With a fish so rich and fatty as the salmon it is plain that the above process can only be regarded as a temporary cure, and fish so treated will only keep for about the same time as kippered herrings or finnan haddocks.

Norwegian Methods—Mild Cure

Cut off the head and split the fish down the back. Wash it clean and put it in salt pickle. After lying in the pickle for three days the fish is taken out and washed in clean fresh water and then stretched upon pieces of lath. These pieces of lath are about an inch and a half broad, but quite thin. They are cut to a length corresponding to the breadth of the fish and sharpened at the ends. One of these spits is put across the back of the fish at the "lugs" or shoulders, another about halfway down, and if the fish is very large another still farther down, the points of the spits being stuck through the skin of the fish. The fish is then "tentered" and hung up in a chimney, where it is smoked over a fire of fir branches for a day and a half or two days. Salmon cured by this process come out something similar in appearance to an Aberdeen-cured haddock, but rather darker in colour.

Hard Cure

Salmon meant to be kept for two or three months are much harder cured. In this case the fish are split into halves to facilitate curing and to make them easier to handle, and to stow in the barrels. It would be advisable first to rub the fish well with a mixture of brown sugar and fishery salt and a little of the same mixture might be put in between the pieces of fish packed into the casks. Hard packing should be avoided; sufficient room left to let the pickle circulate freely. The barrel should be filled quite full of strong, clean pickle (filtered), the end put in and "tightened" and the barrel laid on its bilge. If properly cured, salmon treated in this way should keep for two or three months. The barrel should, however, be opened occasionally and the fish examined. If there is any risk of the pickle turning stale, it should be poured off and fresh substituted, the fish being well washed in clean pickle before being re-packed. When required the pieces of fish should be taken out, well washed in clean fresh water and smoked in the same way as milder cured fish. Owing to the rich nature of the fish this is the only method by which it seems possible to preserve salmon for any length of time apart from canning. Dry-curing would fail to preserve such a fat fish.

In Norway all the smoking is done in the chimneys of dwelling-houses in much the same way as finnan haddock curing was originally done on the Kincardineshire coast.

Turtle Soup

2,070. *We are interested in the manufacture of turtle soup, and should be glad if you could let us have a recipe.* (London.)

A typical recipe is as follows:

Dried turtle	10	lb.
Water	12	gal.
Gelatin	1	lb.
Raw onions	1	,,
Cloves of garlic	3	
Table salt	6	oz.
White pepper	2	,,
Claret wine	2	pts.
Bay leaves	12	
Parsley	4	oz.
Thyme	2	,,
Cloves	½	,,
Corianders	½	,,

Soak the turtle in 4 gal. of cold water and allow to stand for 24 hours, then drain off the water. Soak the gelatin in 1 gal. of the water. Place the balance of the water in a steam pan, add the turtle, and gently simmer until soft. Strain off the turtle through a fine sieve, and return water to a steam pan, making it up to 11 gal. Add the salt, pepper, parsley, thyme, bay leaves and corianders.

Peel and chop the onions and the garlic, add them to the steam pan, bring to the boil and gently simmer for 30 minutes. Add the gelatin, stir well; it is important to see that all the gelatin is dissolved. Pass through a jelly bag, drain all night, and then add the wine.

Cut up the turtle and put 3 oz. of turtle to each half-pint bottle, and fill with soup. Cap and sterilise in retort to 240° F. for 45 minutes.

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NEW COMPANIES

Bell, John (West Bromwich), Limited. (320,563.) 220, Great Bridge Street, West Bromwich. To carry on bus. as biscuit mnfrs., bakers, confectioners, etc. Nom. Cap.: £1,500. Dirs.: J. Bell, 220, Great Bridge Street, West Bromwich (mng. dir.); S. Smith, 23, Dagger Lane, West Bromwich.

British Glycerine Manufacturers, Limited. (319,678.) To carry on the bus. of mnfrs. of and dlrs. in glycerine, etc. Nom. Cap.: £150. Dirs.: To be appointed by the subs. Subs.: T. J. Alexander, 26, Dominic Drive, New Eltham, S.E. 9 (clk.); J. S. Jeapes, 41, Barkwood Way, Farnborough, Kent (clk.); and five others.

British Table and Liquid Egg Holdings, Limited. 6, Watford Way, Hendon, N.W. 4. To enter into an agmt. for the acquisition of interests in inventions relating to the preservation of eggs and the testing of eggs and rendering them nonfertile, etc. Nom. Cap.: £6,000. Permt. dirs.: E. F. Bliss, 110, Kingston Road, Staines; J. D. Doyle, Dr. Eng., M.I.E., St. Dominics, 30, Sycamore Road, Mount Merrion, Blackrock, Dublin; W. J. Clark, The Roxbarn, Bucks Avenue, Watford; J. Durrant, 48, St. Margaret Road, Edgware.

Channel Provender Mills, Limited. (319,148.) Channel Provender Mills, Avonmouth Dock, Bristol. To carry on the bus. of provender and flour millers, etc. Nom. Cap.: £15,000. Dirs.: G. C. Martin, Chuthungar Manor, Tewkesbury, Glos; S. Sainsbury, Hilltop, Midford Lane, Limpley, Stoke, Bath; J. O. Martin, Church Street, Tewkesbury, Glos; E. F. W. Purnell, 126, Bishop Road, Bishopston, Bristol.

Darlington Mushroom Laboratories, Limited. (329,635.) Registered November 13. To carry on the bus. of mnfrs. of and dlrs. in pure culture mushroom spawn, etc. Nom. Cap.: £4,000. Permt. dirs.: H. A. Darlington, 8, Broadwater Road, Worthing (ch.); O. E. Gahm, 8, Broadwater Road, Worthing; J. W. Strode, address not stated; F. W. Divine, ditto; G. R. Rettew, ditto.

Dickinsons (The Bottlers), Limited. (319,416.) 101, Darlington Street East, Wigan. To carry on bus. as mchts. and bottlers of beer, ale, wines, etc. Nom. Cap.: £3,000. Permt. dirs.: E. Dickinson, 106, Spring Street, Wigan (ch.); S. A. Dickinson, Dalronis, Tennyson Drive, Wigan; Mrs. S. L. Middlehurst, Elmroy, Swinley Lane, Wigan; C. S. Dickinson, 101, Darlington Street East, Wigan.

Glenury Distillery, Limited. (319,526.) Trafalgar House, 11, Waterloo Place, S.W. 1. To carry on the bus. of whisky and general distillers, etc. Nom. Cap.: £30,500. Dirs.: H. Attari, 26, Hill Street, W. 1; J. W. Hobbs, 29, Trafalgar Square, S.W. 3.

International Slicers, Limited. (319,614.) Broadway House, Washway Road, Ashton-on-Mersey. To carry on the bus. of mnfrs. of and dlrs. in food slicing machines, etc. Nom. Cap.: £300. Dirs.: Mrs. J. Roberts, Broadway House, Washway Road, Ashton-on-Mersey, Cheshire; T. H. Helsby, same address.

F. J. Jones (Electrical Engineers), Limited. (319,200.) To carry on the bus. of electrical and refrigeration engineers, etc. Nom. Cap.: £500. Dirs.: To be appointed by the subs. Subs.: W. A. Wallace, 56, Hamilton Square, Birkenhead (accnt.); T. Siddall, 13, John Dalton Street, Salford (clk.).

London and Provincial Distributors, Limited. (319,619.) 24-5, Suffolk House, Laurence Pountney Hill, E.C. 4. To carry on the bus. of mnfrs. and distributors of or dlrs. in potato crisps, etc. Nom. Cap.: £100.

London Refrigeration Company, Limited. (319,659.) To carry on the bus. of mnfrs. of and dlrs. in refrigerating plant and electrical goods, etc. Nom. Cap.: £1,000. Dirs.: G. F. Wrigley, The Gables, Brockley Hill, Stanmore, Middlesex; C. Whincop, 54, Station Road, Church End, N. 3.

Mayfair Sterilised Milk Company, Limited. (319,834.) 13, West Street, Clayton, Manchester. To take over the bus. cd. on at Clayton, Manchester, as the "Mayfair Sterilised Milk Co." Nom. Cap.: £10,000. Dirs.: A. Starr, 13, West Drive, Droylsden; W. M. Anderson, Ormescliffe, Washway Road, Sale; T. B. Flint, 4, Flint Street, Clayton.

F. Morrell and Company, Limited. (319,564.) Excelsior Works, Chapel Street, Ancoats, Manchester. To take over the bus. of F. Morrell and Co., Ltd. (in liquidation), and to carry on the bus. of mnfrs. of and dlrs. in cardboard and wooden boxes, etc. Nom. Cap.: £5,000. Dirs.: F. Morrell, Longhurst, Pownall Road, Pownall Park, Wilmslow, Ches. (permt. gov. dir.); Mrs. E. M. Morrell, Longhurst, Pownall Road, Pownall Park, Wilmslow, Ches.

Pattinson's Grain Storage Company, Limited. (319,176.) The Beacon Mills, Whitehaven. To construct silos or warehouses for the storage of grain, etc., and to acquire the freehold estate in land near to the Beacon Mills of John Pattinson and Son, Ltd., at Whitehaven. Nom. Cap.: £2,000. Dirs.: J. Pattinson, Bleamire House, Greysouthen, Cumberland; J. D. Pattinson, Calva House, Workington, Cumberland; W. Pattinson, Bleamire House, Greysouthen, Cumberland.

P.B. Investments, Limited. (319,840.) 26, Budge Row, E.C. 4. To carry on the bus. of brewers and maltsters, etc. Nom. Cap.: £100. Dirs. not named. Subs.: B. E. Edwards, 21, Cannons Lane, Pinner, Middlesex (sec.); Lilian F. Bailey, 33, Leighton Close, Edgware, Middlesex (clk.).

Rees and Gardiner, Limited. (319,504.) 121, Cannon Street, E.C. 4. To take over the bus. of Rees and Gardiner, mnfg. confectioners, of Kent House Lane, Beckenham, Kent. Nom. Cap.: £3,000. Permt. dirs.: E. Rees, 142, Spur Road, Orpington, Kent; H. G. Turner, Normanton on the Wolds, Plumtree, Nottingham.

Ribble Brewery Company, Limited. (319,351.) To carry on bus. as brewers, etc. Nom. Cap.: £100. Dirs.: To be appointed by the subs. Remun. of dirs.: £250. Subs.: J. Collins, 2, Twickenham Road, Teddington (mng. clk.); D. J. Hyamson, Knowstone, Clarence Road, S.W. 4; and five others.

Stonehaven Bonded Warehouse Company, (319,794.) 11, Waterloo Place, Pall Mall, S.W. 1. To acquire land, distilleries, bonded and bottling stores; to carry on the bus. of whisky and general distillers, etc. Nom. Cap.: £10,000. Dirs.: H. Attari, 26, Hill Street, W. 1; J. W. Hobbs, 29, Trafalgar Square, S.W. 3.

Temple Graham and Company, Limited. (319,399.) Broad Cottage, Barton Turf, Neatishead, Norfolk. To carry on the bus. of mushroom growers and marketers, etc. Nom. Cap.: £2,500. Dirs.: A. M. Temple Trubshaw, Barton Hall, Neatishead, Norfolk; P. G. Hastings, Broad Cottage, Barton Turf, Neatishead.

Vit-in-It Sweetmeat, Limited. (319,403.) Titford Lane, Blackheath, near Birmingham. To carry on the bus. of mnfg. and wholesale confectioners, etc. Nom. Cap.: £12,000. Permt. dirs.: W. S. Sykes, address not stated; T. C. Fillery, 30, Sunny Bank Road, Quinton, Birmingham (mng. dir.).

Western Crisps, Limited. (317,557.) To produce and market potatoes and potato crisps, etc. Nom. Cap.: £10,000. Dirs.: P. Scutt, address not stated; S. Fortescue-Tierney, 21, Freedom Park Villas, Plymouth; J. H. A. Tolkein, address not stated; A. C. F. Windeatt, 3, Buckland Terrace, Plymouth.

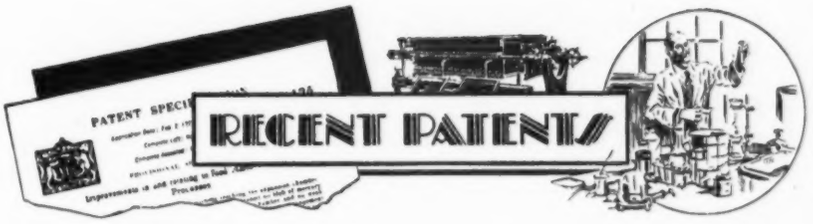
Western Food Products (Fylde), Limited. (318,456.) Common Edge Lane, Marton, Blackpool. To carry on the bus. of mnfrs. of and dlrs. in confectionery, chocolates, foodstuffs, etc. Nom. Cap.: £2,000. Dirs.: To be appointed by the subs. Subs.: J. Holdsworth, 66, Worsley Road, Farnworth (cashier); W. Plummer, 34, Turnbull Road, Longsight, Manchester (clerk).

Winchester Millers, Limited. (319,021.) 162, Above Bar, Southampton. To carry on the bus. of flour millers, etc. Nom. Cap.: £6,000. Dirs.: R. H. Shrimpton, Roedean, Bassett Avenue, Southampton (permanent); Mrs. N. Shrimpton, Roedean, Bassett Avenue, Southampton; N. O. Simmons, 3, Clifton Road, Winchester.

Winship, William, and Company (1936), Limited. (318,042.) To carry on the bus. of mnfrs. of and dlrs. in milk, cream, ice-cream, butter, etc. Nom. Cap.: £100. Dirs.: W. Winship, 12A, Wentworth Place, Newcastle-on-Tyne; Mrs. C. Winship, 12A, Wentworth Place, Newcastle-on-Tyne.

Yogfruit Erat, Limited. (319,407.) To carry on the bus. of mnfrs. of and dlrs. in milk products. Nom. Cap.: £1,200. Dirs.: To be appointed by the subs. Remun. of dirs.: As voted by the co. Subs.: W. E. Wolff, 1-2, Finsbury Square, E.C. 2 (solr.); L. Cork (?), 1-2, Finsbury Square, E.C. 2.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

29573. ASPINALL, SIR A. E.: Decolourisation, etc., of sugar-cane juices, etc. October 30.

29680 and 29681. INDUSTRIAL PATENTS CORPORATION: Treatment of edible fats, etc. October 31. (United States, August 12.)

29948. MACILWAINE, A. W.: Treatment of cocoa beans. November 3.

29963. ALLEN, H. E., and MCCALEB, A. G.: Manufacture of sausages, etc. November 4.

30015. PEEK FREAN AND CO., LTD.: Confectionery. November 4.

30172. SHONE, G. E.: Means for supporting bacon, etc., during curing. November 5.

30698. BEAVER, A. E. A., CORN PRODUCTS CO., LTD.: Products derived from barley, etc. November 10.

30809. CHERRY-BURRELL CORPORATION: Pasteurisation of milk. November 11.

31201. BUER, C. H.: Manufacture of lecithin preparations. November 14.

31284. BURGESS, A. F. (LONG CO.): Preservation of foodstuffs. November 16.

31499. AKTIEBOLAGET G. ARENHS MEKANISKA VERKSTAD, DANIELSSON, P.: Method, etc., for eviscerating fishes. November 17.

31658. HIGGINSON, G. S.: Emulsifying machine for treating milk, etc. November 18.

32168. BELLAMY, A. J. (HAWLEY): Method, etc., for concentrating liquid albumen, etc. November 24.

32256. ELION, L.: Powdered sugar. November 25.

32291. GALLAWAY, H. D. M.: Machines for removing shells from eggs. November 25.

Complete Specifications Accepted

455,816. GRIFFITH LABORATORIES, INC.: Meat-curing salt product.

455,846. STANDARD BRANDS, INC.: Process for inhibition of mould growth on baked goods.

455,902. SPECHT, M.: Process of conserving roasted coffee.

456,016. SCAMELL, K. M., TELFER, J. W., SHAW, J. J. A., and HILL TOP DAIRIES, LTD.: Manufacture, packing, and dispensing of ice-cream.

456,075. JEANPROST, C.: Preservation of fermentable liquids.

456,266. SORNET, F., KOPKA, A., and CHOCOLAT-MAGNIEZ-BAUSSART: Process for manufacturing caramel and product made thereby.

456,273. KRÖGER, O.: Method of and apparatus for preparing whipped cream. (April 20, 1935.)

456,346. NICORESTI, C. A. COFMAN: Preservation of edible fungi, chiefly mushrooms, and increasing their food value.

456,593. GAGE, L. W.: Receptacles for foodstuffs.

456,753. SALMON, J. T.: Grading and testing apparatus for eggs. (Cognate application 12356/36.)

456,845. BONNER, T. W., SALOMON, S. M., and BUSCH, S.: Reduction of grain and bran and their subsequent conversion into bread or like product. (Cognate application 26035/35.)

456,858. ROGERS, F. H. (NAME CORPORATION): Manufacture of sausages and like food products.

456,882. SOC. ANON. DES BREVETS FAUTH: Production from whale blood of blood meal suitable for use as a feeding stuff for animals.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

452,853. **Beverages.** ARNELLA SOC. ITALIANA PER L'INDUSTRIA DELL' ACIDO CITRICO ED AFFINA, Palermo, Italy.

Lemon powder is obtained by slowly drying a paste of concentrated lemon juice and citric acid powder and disintegrating the mass obtained.

453,305. **Food preparations; medicated preparations.** DUNHAM, H. V., 62, West Main Street, Bainbridge, New York, and CASEIN MANUFACTURING CO. OF AMERICA, INC., 350, Madison Avenue, New York, both in U.S.A.

Compositions containing acid-precipitated casein are made by mixing the casein with sufficient water to bring the water content of the casein to 25 to 32 per cent., and with a substance capable of reacting with the casein, the materials being thoroughly incorporated together by kneading and extruding the moist mass while subjecting it to sufficient heat and pressure to plasticise and homogenise the materials. The product may then be dried and ground, and may be used in paints, sizes, adhesives, medicinal preparations, and food products. Examples are given of compositions of moist acid-precipitated casein and sodium bicarbonate, which may be dissolved in water and used as a glue or size—*e.g.*, in a mixture with lime and sodium fluoride—of the casein and other sodium or potassium salts—*e.g.*, borax, sodium fluoride, and potassium phosphate—of the casein and ferric hydroxide, for medicinal purposes, of the casein, iron lactate, and sodium bicarbonate, of the casein, copper sulphate, and sodium bicarbonate, and of the casein and naphthionic acid, to which may be added lime, sodium carbonate, and trisodium phosphate for the preparation of a glue. To the compositions may also be added other materials—*e.g.*, wood flour, whiting, clays, pigments, dextrine, starch, hide glue, vegetable seed meals, glycerine, or waxes.

453,417. **Confectionery.** ROBINSON, R. W., and OLSEN, A., 1975, Market Street, San Francisco, U.S.A.

A powder is made by drying and reducing a mass of fudge or fondant, the powder being capable of reconstruction into fudge by simple melting with water and heat and thereafter cooling the mass without a creaming or graining step. The original fudge may be without the usual fat content, the addition of fat being effected during the reconstitution. The fudge is made, for example, of unsweetened evaporated milk, corn syrup, granulated sugar, fat (butter, coconut butter, or hydrogenated fat), salt, and a flavouring such as chocolate, cocoa, or vanilla. Examples of proportions are referred to. The ingredients are mixed together and cooked at 235° to 255° F., with constant agitation, and then poured into a beater, having a cold-water jacket, in which the temperature is reduced to 90° to 120° F., before the agitator is started. When the mass is properly creamed and grained it is warmed to 125° to 160° F., and is spread on pans to set. Alternatively, the ingredients are cooked to 235° to 255° F. and then cooled to 150° to 200° F. The mass is then creamed by stirring in a small quantity of fondant, spread in layers, and allowed to set. This fondant is composed of 5 to 20 parts by weight of corn syrup to 75 parts of sugar and 16 parts of water, which are cooked, cooled, and creamed by stirring. The fudge may be dried by subjecting to heat in an exhaust chamber, and may be powdered by passing the dried fudge through rollers, scraping it off, and rolling again until sufficiently reduced. Residual lumps are removed by screening. If the powder is reconstituted with an excess of water, the substance may be used for icing cakes. To make caramel candy, a small excess of water is used in the reconstitution, and the mixture is cooked to the "medium ball" stage—*i.e.*, when it will form medium balls when a small quantity is dropped into cold water. It is then spread out to cool and set. If nut caramels are required, chopped nuts are stirred into the mixture before spreading out. It is suggested that in the making of fudge very fine sugar crystals are separated by a film of uncrystallisable substances either produced in the batch itself or added in predetermined amounts. This film may consist of added invert sugar, or invert sugar pro-

duced in the batch by adding acid or acid salts, such as citric, tartaric, or acetic acid, or cream of tartar to plain sugar and cooking. The invert sugar may be formed by cooking sugar and water for long periods without acid additions, or slightly caramelising the sugar by higher heating. Other colloidal and non-crystallisable materials, such as corn syrup or glucose, honey, gum arabic, dextrine, tragacanth, gelatine, may be used.

453,530. **Preserving cream.** HARTMANN, S. H., 200, King Street, Melbourne, Australia.

Cream is prepared for transportation and storage by centrifugally producing a cream having a fat content equal to or more than that of butter, passing it in a thin layer or film through a heat zone, where it is subjected to vacuum to withdraw air from it, and then delivering it, if desired under vacuum, while still hot or after cooling, into receptacles capable of being hermetically sealed. The cream may be agitated after collection from the film, etc., state to improve its consistency. Salt or brine may be added to it prior to the agitation. The cream may be prepared from fresh milk or milk of low acidity by centrifuging, pasteurising, and recentrifuging. Alternatively, the milk may be pasteurised and then subjected to a single centrifuging to give cream of the desired fat content. The cream may be spread by centrifugal force into the thin layer of film to pass or drop downwardly through the zone where it is subjected to the heat and vacuum treatment. Specification 380,107 is referred to.

453,877. **Treatment of pectin.** CALIFORNIA FRUIT GROWERS' EXCHANGE, 607, South Hill Street, Los Angeles, California, U.S.A.

When the materials from which pectin is obtained (pomace, citrus peel, etc.) or pectin sols are treated for a certain time with an acid reagent, preferably hydrochloric acid (other inorganic acids or organic acids such as citric or lactic acid may be used), the setting time is progressively increased with the length of the treatment, up to a certain point, after which the setting time again decreases. The jelly grade increases or decreases simultaneously with the setting time, being in some cases improved to a marked degree. Thus 1¼ per cent. pectin sol, acidified with HCl to a *p*H of 0·1 and stored at room temperature, had setting times and jelly grades of 9 sec. and 180 respectively after one hour's treatment, and 25 min. and 226 respectively after 3 days; the figures decreased after that time. The time of treatment to obtain a given effect is reduced at higher temperatures—*e.g.*, 40° to 60° C. (temperatures higher than 85° C. should not be employed). The *p*H of the acidified sol need not be 0·1, but should be not more than 2·5. For treatment of solid pectinous material the acid is supplied in alcoholic solution; other organic solvents are detailed. A pectin so treated to increase the setting time may be treated to shorten the setting time, if desired, by the further use of acid together with methyl alcohol. Full details of extraction of the pectin and subsequent separation of the treated pectinous matter or pectin are described.

LATEST TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

ALONA.—571,344. **Dried fruit, canned fruit, bottled fruit, vegetables (for food), fish, and meats.** W. AND G. BOLDERSTON AND CO., LTD., 8b, Victoria Street, Liverpool, 2. (By Consent.) December 2.

BIRD'S BAKING POWDER.—571,308. **Baking powder.** ALFRED BIRD AND SONS, LTD., Devonshire Works, High Street, Deritend, Birmingham. (Associated.) November 18.

CHOFFY. — 572,617. **Cocoa.** CHOFFY PRODUCTS, LTD., Sunya House, Cumberland Park, London, N.W. 10. December 2.

CLARK'S GINGER JACK.—571,286. **A non-alcoholic, non-aerated, and non-medicated beverage made from ginger and barley.** CLARK'S CREAMED BARLEY, LTD., Western Granary, Malabar Street, London, E. 14. November 18.

Registration of this trade mark shall give no right to the exclusive use of the word "Clark's".

DEVONSHIRE TOR. — 571,312. **Substances used as food or as ingredients in food.** WAITROSE, LTD., 19, 21, and 23, Gloucester Road, South Kensington, London, S.W. 7. November 18.

Registration of this trade mark shall give no right to the exclusive use of the words "Devonshire Tor".

The applicants undertake to use the mark only on goods produced in Devonshire.

DOC APPLE.—572,171. **Apples.** PACIFIC NORTHWEST FRUITS, INC., 310, Liberty Building, City of Yakima, County of Yakima, State of Washington, United States of America. November 25.

Registration of this trade mark shall give no right to the exclusive use of the words "Doc Apple".

FREETEX.—571,929. **Edible fats.** UNITED PHOSPHATE AND MALT CO., LTD., Uphosma House, Chase Road, London, N.W. 10. (By Consent.) November 18.

GOLDEN GLORY.—571,741. **Fresh citrus fruits.** D. AND W. MURRAY, LTD., 28, Finsbury Street, London, E.C. 2. November 18.

The above-mentioned goods and goods of a like kind will be struck out from the goods of Registration No. 327,130 (1708) if and before the applicants' mark is registered.

JIMMY O'GOBLIN.—572,384. **Puddings.** SIMPSON READY FOODS, LTD., The Garden Factory, Stretford Road, Urmston. (Associated.) November 25.

KEMAX.—571,519. **Edible fats and edible oils.** TIDSWELL, BAILEY AND TIDSWELL, LTD., Chef-de-Set Mills, Carnarvon Street, Cheetham, Manchester, 3. November 18.

LUCKY STAR.—572,176. **Canned fish, canned fruits, and canned vegetables, all for human use.** ICKO GOLDSTEIN, 4, Brabant Court, Philpot Lane, London, E.C. 3. November 25.

OLIVIA.—572,016. **Chocolate, cocoa, and confectionery, but not including ice-cream and not including any goods of a like kind to ice-cream.** ZDĚNEK KOUKOL, Orlov 368, Kutná Hora, Czechoslovakia. December 2.

PURRS.—572,088. **Substances used as food or as ingredients in food.** JOHNSON, RIDDLE AND CO., LTD., 32, Southwark Bridge Road, London, S.E. 1. November 18.

QUIXA.—569,400. **Lard substitutes for food.** ANGLO DAIRIES AND CANNERS, LTD., 135, Tooley Street, London, S.E. 1. November 18.

SUNDILLA. — 571,641. **Ice-cream wafer biscuits, ice-cream cake cone biscuits, and ice-cream cornet biscuits.** F. W. HAMPSHIRE AND CO., LTD., Sunnydale Works, Sinfin Lane, Derby. (Associated.) November 18.

SUNNY MORN.—572,313. **Butter.** APLIN AND BARRETT, LTD., Newton Road, Yeovil, Somerset. November 18.

SUPERVITA. — 571,845. **Milk products for food.** MELTON MOWBRAY DAIRIES, LTD., 39, Victoria Street, London, S.W. 1. November 25.

TOPANCA PRODUCTS.—570,542. **Preserves (for food).** MODERN FOODCRAFT, LTD., 13, Station Parade, Ealing Common, London, W. 5. November 18.

VANOBEAN. — 568,933. **Essences (non-alcoholic) and flavourings (non-alcoholic), all being in liquid form for use as food, and partly produced from vanilla beans.** SUPREME MANUFACTURING CO., LTD., 58, Weaman Street, Birmingham, 4. November 18.

VIMLET. — 572,203. **Preparation for making non-alcoholic drinks.** J. N. NICHOLS AND CO., LTD., Britannic Works, Ayres Road, Brooks's Bar, Manchester, 16. (Associated.) November 18.